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## **Layaway Procedures for U.S. Army Facilities, Volume II: Inspection and Maintenance and Repair Checklists**

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This two-volume report describes facility layaway procedures for U.S. Army facilities, with an emphasis on Fort Dix, New Jersey.

Volume I focuses on decision criteria and the economics of facility layaway. Decision matrices for choosing cost-effective layaway strategies are presented. The concepts behind differing maintenance and repair (M&R) standards are addressed. Strategies for both short- and long-term layaway periods are described. The influence of the allowed reactivation period on M&R strategies is also described. Deactivation, periodic M&R, and reactivation for buildings and utilities are discussed, as are environmental and security concerns. The report concludes that facility layaway is technically feasible at an affordable cost.

Volume II addresses the specific inspection and M&R items associated with all of the different systems and components for buildings and utilities. These items are presented in a checklist format. A brief explanatory section precedes each checklist.

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## LAYAWAY PROCEDURES FOR U.S. ARMY FACILITIES, VOLUME II: INSPECTION AND MAINTENANCE AND REPAIR CHECKLISTS

### INTRODUCTION

#### Background

Base closure and realignment<sup>1</sup> is causing significant changes in mission and population at several Army installations. Within the U.S. Army Training and Doctrine Command (TRADOC), several forts are being affected, but the greatest mission change is occurring at Fort Dix, NJ. There, the mission has been changed to primarily support Army Reserves and provide a site for mobilization training capabilities. This new mission is leaving vacant many facilities that have been regularly occupied. TRADOC plans to use these facilities intermittently to accommodate surges of Reserve component training each year. Other facilities must be maintained for occupancy on short notice as mobilization training requirements develop months or years from now. This affects hundreds of thousands of square feet of building space. Existing regulations<sup>2</sup> address some procedures, but do not provide comprehensive guidance for layaway (deactivation, periodic maintenance and repair, and reactivation) of specific buildings or building groups with their related utility networks and grounds for the lowest life-cycle cost in maintaining and operating those facilities. Neither do any other Army documents provide the necessary guidance.

The U.S. Army Construction Engineering Research Laboratory (USACERL) was tasked by TRADOC to develop layaway procedures on a life-cycle cost basis, with an emphasis on the facilities at Fort Dix.

#### Objective

The objective of this study is to develop procedural facility layaway guidelines, based on the lowest life-cycle cost, for individual buildings, building groups, related utility networks or subnetworks, and surrounding grounds.

Volume I describes the decision criteria and economic considerations involved in developing the guidelines. Volume II presents the procedures and checklists for each facility component.

#### Approach

Background information on the problem was gathered, although there was little available. A variety of Fort Dix site-specific facility information was reviewed, site visits were made to Fort Dix, and all available technical literature was studied. This included literature from equipment manufacturers, material suppliers, government agencies, and appropriate trade journals. Organizations known to be involved with facility layaway were contacted and interviewed. These organizations included U.S. Army Materiel

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<sup>1</sup> *Base Realignments and Closures: Report of the Defense Secretary's Commission* (Department of Defense, December 1988).

<sup>2</sup> *Army Regulation (AR) 210-17, Inactivation of Installations* (Headquarters, Department of the Army [HQDA], January 1967).

Command (AMC), the U.S. Navy, the National Park Service (NPS), the National Aeronautics and Space Administration (NASA), and others. Finally, studies performed by other Government laboratories were reviewed.

A checklist of procedures was identified for each different type of facility component and material. The approach taken divided the facilities into two distinct groups: buildings and utility systems. Then, each group was further divided into specific components. The intent was to make the component checklists as generic as possible to facilitate use at other installations. However, since the focus of the study was Fort Dix, components and/or materials present at other installations but not subject to layaway at Fort Dix are not included. These checklists incorporate existing state-of-the-art technologies for facility layaway. This project did not include research into new or innovative methods.

A matrix approach was integrated with the checklists. The matrix incorporated the decision variables of length of the layaway period, allowed reactivation time, and three levels of maintenance and repair (M&R) activity. The life-cycle cost analyses were based on those variables. The specific costs used in the analyses pertain to Fort Dix. Geographical and climatic variables, outside of those applicable to Fort Dix, were not considered in developing the checklists.

Facility issues specifically or uniquely applicable to Fort Dix were studied to provide a complete analysis necessary for a proper layaway plan.

## Scope

This report addresses the procedures for the layaway of U.S. Army facilities. These include tasks associated with deactivation, periodic M&R, and reactivation. The procedures are applicable to the variety of facilities scheduled for layaway at Fort Dix, and to facilities at other locations with similar climate. The procedures are supplemented and supported with cost analyses. Where appropriate, explanations are given on the assumptions used and the methods employed.

Because of the complexity of developing the needed guidelines and the short timeframe specified by TRADOC, this study should be considered a Phase I effort that identifies and consolidates existing technologies into a single package, with main emphasis on Fort Dix.

## Mode of Technology Transfer

This report has been prepared in two volumes to assist in the technology transfer process. Volume I is intended primarily for installation and Major Army Command (MACOM) managers and budgeteers in developing strategies and deciding "big picture" issues. Volume II is intended for facility inspectors, planners, estimators, and others in identifying specific work items, preparing work orders, and preparing contracts. Some topics in Volume I should also be of interest to those same people.

Since this report is not comprehensive in terms of facility and component types addressed, technology transfer through a Department of the Army Technical Manual or Pamphlet, or through a similar MACOM publication, is not recommended. If and when layaway procedures are developed for additional kinds of facilities and locations representative of the Army as a whole, incorporation into a technical manual or pamphlet would be recommended.

## ABBREVIATIONS

A/E	architectural/engineers
ADP	automatic data processing
AHU	air-handler unit
AMC	U.S. Army Materiel Command
ANSI	American National Standards Institute
AR	Army Regulation
ARMA	Asphalt Roofing Manufacturers Association
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BUR	built-up roof
CFC	chlorofluorocarbon
DEH	Directorate of Engineering and Housing
DOD	Department of Defense
DTMF	dual-tone multifrequency
DX	direct expansion
EMCS	emergency monitoring and control system
EMS	engineered management system
EPA	Environmental Protection Agency
EPDM	ethylene-propylene-diene monomer
EPRI	Electrical Power Research Institute
ETAC	U.S. Force Environmental Technical Applications Center
EUAC	Equivalent Uniform Annual Cost
Fed Spec	Federal Specification
FID	field interface device
FRP	fiberglass-reinforced plastic
GPM	gallons per minute
HSWA	Hazardous Solid Waste Amendments
I/I	infiltration/inflow
IAQ	indoor air quality
IEEE	Institute of Electrical and Electronic Engineers
LPI	Leak Potential Index
M&R	Maintenance and Repair

## ABBREVIATIONS (Cont'd)

MACOM	Major Army Command
MIL	Military Specification
MOGAS	motor gasoline
MRPM	Maintenance Resource Prediction Model
NASA	National Aeronautics and Space Administration
NCEL	Naval Civil Engineering Laboratory
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NJDEP	New Jersey Department of Environmental Protection
NPS	National Park Service
NRCA	National Roofing Contractors Association
OSHA	Occupational Safety and Health Administration
PM	preventive maintenance
RCRA	Resource Conservation and Recovery Act
SHDP	Steam Heat Distribution Program
TM	technical manual
TR	technical report
TRADOC	U.S. Army Training and Doctrine Command
USACERL	U.S. Army Construction Engineering Research Laboratory
USAHSC	U.S. Army Engineering and Housing Support Center
UST	underground storage tank

## METRIC CONVERSION TABLE

1 in.	=	25.4 mm
1 ft	=	0.305 m
1 psi	=	6.89 kPa
1 gal	=	3.78 L
°F	=	(°C + 17.78) × 1.8

## APPENDIX A:

### KEY TO USING INSPECTION AND MAINTENANCE AND REPAIR (M&R) CHECKLISTS

The purpose of the inspection and M&R checklists is to help inspection and maintenance personnel identify and correct certain defects associated with facility deactivation, periodic M&R, and reactivation.

There are two distinct groups of checklists: one for building systems and the other for utility systems. Both are described below. Also, each checklist consists of two parts: inspection items and applicable M&R actions.

The building systems checklists attempt to be all-inclusive, thereby applying to a variety of building types. To facilitate the inspection process and to group items by logical work type, the checklists address nine distinct components:

1. Roofing
2. Exterior closure
3. Interior construction
4. Electrical
5. Plumbing
6. Heating
7. Air-handler units
8. Refrigeration systems
9. Mess hall equipment.

These components were further divided into subcomponents, consisting of their common building elements. Each building subcomponent (e.g., exterior wall) was individually examined for all its common elements or material types (e.g., brick masonry units). Checklists were then developed for each material type listing all possible corrosive, deteriorating, defective, or unsightly conditions (e.g., cracks and holes). All these conditions are listed for each of the building subcomponents under the appropriate component heading.

The utility systems were classified into four major subgroups: the steam heating system, the gas distribution system, the petroleum products storage system, and the sanitary system. Checklists were developed for each of the utility system components and their various subcomponents (e.g., sanitary system water distribution lines, wells, tanks, etc.).

Within each checklist, standard notations are used to indicate the level of inspection or M&R action, and period of inspection or M&R action. These are:

#### MAINTENANCE STANDARD

Pfr = Preferred  
Min = Minimal

#### PERIOD OF ACTION

D = Deactivation  
P = Periodic M&R  
R = Reactivation

When a decision to lay away a facility has been made, that facility enters the deactivation phase of the layaway cycle. Tasks to be performed during this phase are intended to place the specific component



into a desired condition or layaway status. Periodic inspection and M&R occur at designated periods of time during the dormant phase of the layaway cycle. Depending on level of action and duration of deactivation period, the designated periods are from 3 months to 1 year. These activities preserve the component at the desired condition or layaway state. The reactivation phase begins when a decision to activate a facility has been made. When a facility is to be reactivated, all its components and subcomponents must be brought into proper working order and the facilities restored to an appropriate condition level.

Columns titled "Pfr" and "Min" are for the Preferred and Minimal maintenance standards, respectively. When a period-of-action notation (D, P, or R) appears in these columns for inspection, it signifies that if the specific distress is present, it should be noted for correction. Specific corrective actions are listed in the M&R portion of the checklists that correspond to the inspection findings. Note that period-of-action notations (D, P, or R) vary for the Preferred and Minimal standards. (Volume I, Chapter 2 of this report includes a detailed definition of each of these terms.)

The additional columns on the checklists are headed by combinations of the deactivation and reactivation periods discussed in Volume I, Chapter 2. A deactivation period is defined either as a layaway cycle of less than 1 year or greater than 1 year ( $D < 1\text{yr}$  or  $D > 1\text{yr}$ ). A reactivation period is defined either as a make-ready time of less than 45 days or greater than 45 days ( $R < 45\text{d}$  or  $R > 45\text{d}$ ). The two deactivation periods and the two reactivation periods can be combined into four distinct period-of-action/length-of-time combinations.

On certain checklists, the reactivation period is supplanted by a notation "heat" or "no heat." This notation indicates that whether or not to heat the facility is a governing factor in place of reactivation time, regardless of the length of time allowed for reactivation.

An "X" in any action/time combination column corresponds to applicable D, P, and R notations in the Preferred and Minimal columns. When an "X" appears, an inspection or M&R procedure is to be taken. Dual entries in some of the columns are not typographical errors: they signify different required actions for different action/time combinations.

To use a checklist, the desired period-of-action/length-of-time and desired maintenance standard must be known. Those decisions originate from the decision matrices (discussed in Volume I) and will have been made beforehand by senior management personnel. They determine the appropriate period-of-action/length-of-time column and maintenance standard column to be used.

#### EXAMPLE:

Given: Facilities will be placed in a layaway status for a period exceeding 1 year and more than 45 days will be allowed for reactivation. The Preferred M&R strategy will be pursued.

A portion of the checklist for the exterior wall subcomponent of the exterior closure component for buildings is shown below.

# EXTERIOR CLOSURE - EXTERIOR WALL

NOTE:	D = Deactivation	Pfr = Preferred				
	P = Periodic	Min = Minimum				
	R = Reactivation	yr = year				
		d = days				
=====	=====	=====	=====	=====	=====	=====
BRICK MASONRY UNITS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
=====	=====	=====	=====	=====	=====	=====
Cracks & holes	D/P/R					X
=====	=====	=====	=====	=====	=====	=====

As can be seen in the heading of the left-hand column, this portion of the checklist applies to all buildings with brick exterior walls. When inspecting brick buildings in a layaway scenario of more than 1 year with an allowed reactivation time of more than 45 days, this checklist should be used.

To know what to inspect for, the user must go to the D>1yr and R>45d column. Any "X" appearing indicates a potential action. Where an "X" is found, the user should move over to the "Pfr" column and note if a D, P, or R is present. These letters indicate that actions are required at Deactivation, Periodically, and/or at Reactivation. Some actions may be needed at only one phase whereas others may be needed at multiple phases.

This example shows that a potential distress of cracks and holes may occur, and that exterior brick walls should be inspected for those distresses during the deactivation, periodic M&R, and reactivation phases of the entire layaway cycle.

The checklist is used in a similar fashion for identifying required M&R actions.

## **APPENDIX B:**

### **INSPECTION AND M&R CHECKLISTS FOR ROOFS**

#### **Inspection and M&R Procedures**

Visual inspection is an excellent method of finding roofing problems that can be repaired before major damage occurs. This is true for both actively used and deactivated buildings. The inspection procedure described in USACERL TR M-90/04, *ROOFER: An Engineered Management System (EMS) for Bituminous Built-Up Roofs*, should be used in conjunction with the provided checklists. USACERL TR M-87/13, Vol II, includes more detailed descriptions and color photographs to aid in identifying BUR distresses. Similarly, a planned USACERL distress manual for single-ply roofing systems contains descriptions for identifying single-ply distresses.

It is not possible to find all potential sources of leaks during a visual inspection. This is especially true when the roof membrane is hidden by a layer of ballast. For an occupied building, roof leaks would be reported before substantial damage was done to the interior of the building. For deactivated buildings, interior inspections must be performed to find leaks and stop them in order to limit damage. Leakage activity should be documented and repairs performed. These areas should be periodically rechecked for continuing leakage. Documentation of the previous damage is critical for determining if new activity has occurred. The appendix contains guidance on how to determine where roof leaks originate.

The checklists provide general repair procedures for each of the distresses. This information can be supplemented with the *Manual of Roof Maintenance and Roof Repair* published by the National Roofing Contractors Association (NRCA) and Asphalt Roofing Manufacturers Association (ARMA)<sup>3</sup> and USACERL TR M-89/04, *Handbook for Repairing Nonconventional Roofing Systems*.

#### **General Notes Regarding Roofing**

Visual BUR inspections should be performed in accordance with USACERL TR M-87/13, Vol II. Visual inspections for ethylene-propylene-diene monomer (EPDM) single-ply roofs should be performed in accordance with the previously mentioned USACERL draft distress manual for single-ply roofing systems. As part of all visual inspections, debris should be removed from the rooftop and all drains and scuppers should be cleared.

The deactivation inspection should include a nondestructive roof moisture survey in accordance with USACERL TR M-90/04, using the aerial infrared technique. Assistance can be provided by the U.S. Army Engineering and Housing Support Center (USAEHSC).

Only high-severity distresses are recorded during the visual inspections, except for the "Preferred - Deactivation" case, in which both medium- and high-severity distresses are recorded.

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<sup>3</sup> *Manual of Roof Maintenance and Roof Repair* (National Roofing Contractors Association [NRCA] and Asphalt Roofing Manufacturers Association [ARMA], January 1981).

Temporary repairs of all recorded high severity distresses should be made immediately to alleviate immediate water entry problems until permanent repairs can be made. Permanent repair of all recorded distresses should be accomplished as well as replacement of all wet insulation and overlying membrane except for during periodic inspection (Minimal option), in which only temporary repairs are performed.

The periodic visual inspection of the roof should be accomplished on an annual basis, preferably in the spring.

Interior inspections for roof leakage activity should be done in conjunction with interior construction inspections.

### **Checklist Contents**

The roofing system consists of all parts of the roof except for the roof deck, parapets, and gutters. The subcomponents are the waterproofing membrane, insulation, vapor retarder, fasteners, ballast, curbing, and flashing. There are three checklists for the dominant roofing types at Fort Dix: single-ply, built-up, and shingled roofing. The lists below are the distresses identified on each of the three checklists. The two-letter abbreviations below for single-ply and built-up roofing; and the four-digit distress codes for each checklist item, are part of the ROOFER engineered management system documented in USACERL TR M-90/04.

#### ***Single-Ply Roofing***

- Base Flashing Membrane Material (BM)
- Base Flashing Coated Metal (BC)
- Metal Cap Flashing (MC)
- Embedded Edge Metal (EM)
- Flashed Penetrations (FP)
- Pitch Pans (PP)
- Interior Drains and Roof Level Scuppers (DR)
- Blisters (BL)
- Ridges, Wrinkles, and Folds (RG)
- Splits (SP)
- Holes, Cuts, and Abrasions (HL)
- Defective Seams (DS)
- Surface Coating Deterioration (SC)
- System Securement Deficiencies (SS)
- Membrane Support (MS)
- Patching (PA)
- Debris and Vegetation (DV)
- Improper Equipment Supports (EQ)
- Ponding (PD)
- Wet Insulation (IN)

#### ***Built-Up Roofing***

- Base Flashing (BF)
- Metal Cap Flashing (MC)

Embedded Edge Metal (EM)  
Flashed Penetrations (FP)  
Pitch Pans (PP)  
Interior Drains and Roof Level Scuppers (DR)  
Blisters (BL)  
Ridges (RG)  
Splits (SP)  
Holes (HL)  
Surface Deterioration (SC)  
Slippage (SL)  
Patching (PA)  
Debris and Vegetation (DV)  
Improper Equipment Supports (EQ)  
Ponding (PD)  
Wet insulation (IN)

*Shingled Roofing*

Step Flashing  
Metal Cap Flashing  
Flashed Penetrations  
Valley Flashing  
Caulking  
Clawing  
Improper Nailing/Nail Rejection  
Breakage/Damage  
Blistering  
Loose Tabs  
Ice Dams  
Debris and Vegetation  
Improper Equipment Supports

# SINGLE-PLY EPDM - MAINTENANCE AND REPAIR

NOTE:

D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

BASE FLASHING, MEMBRANE MATERIAL	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
BMH1 - Holes, splits, or tears in flashing.	D/P/R			X		X
	D R		X		X	
		D/P/R		X		X
		D	X		X	
BMH2 - Exposed gaps at top termination of the base flashing.	D/P/R			X		X
	D R		X		X	
		D/P/R		X		X
		D	X		X	
BMH3 - Open side laps in the flashing which allow water to penetrate through the entire lap width.	D/P/R			X		X
	D R		X		X	
		D/P/R		X		X
		D	X		X	
BMH4 - Solvents, oil, or other chemicals with deterioration of the base flashing.	D/P/R			X		X
	D R		X		X	
		D/P/R		X		X
		D	X		X	
BMM1 - Slippage, wrinkling, blistering, pulling, unbonding, or bridging of base flashing material.	D		X	X	X	X
BMM2 - Crazing of the flashing with deterioration but watertight.	D		X	X	X	X
BMM3 - Solvents, oil, or other chemicals with no deterioration of the base flashing.	D		X	X	X	X
BMM4 - Flashing has repairs made with dissimilar materials.	D		X	X	X	X

BMM5 - Side lap is unattached or fishmouthed through more than half of the lap width but not allowing water to penetrate through the entire lap width.	D			X	X	X	X
BMM6 - Loose or missing termination bar where no counterflashing is used.	D			X	X	X	X
BMM7 - Loose or missing nailing strip.	D			X	X	X	X
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M&R activities as required:							
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BMH1 - Repair base flashing by covering localized defects with new flashing material.	D/P/R				X		X
	D R			X		X	
		D R		X	X	X	X
		D		X		X	
BMH2 - Install extension of counterflashing over top termination of base flashing.	D/P/R				X		X
	D R			X		X	
		D R		X	X	X	X
		D		X		X	
BMH3 - Repair open side lap with patches of new flashing material.	D/P/R				X		X
	D R			X		X	
		D R		X	X	X	X
		D		X		X	
BMH4 - Remove contaminate and effected parts of the base flashing. Repair flashing with new material.	D/P/R				X		X
	D R			X		X	
		D R		X	X	X	X
		D		X		X	
BMM1 - Reattach affected flashing. Provide top termination to reduce slippage and provide nailing strip to reduce bridging. Cut flashing membrane in tension and add additional material as needed.	D			X	X	X	X
BMM2 - Cover affected material with new flashing material.	D			X	X	X	X

BMM3 - Remove contaminants from base flashing.	D		X	X	X	X
BMM4 - Remove dissimilar materials, clean affected area, and repair with new flashing material.	D		X	X	X	X
BMM5 - Cover side lap with new flashing material.	D		X	X	X	X
BMM6 - Reattach or install new termination bar.	D		X	X	X	X
BMM7 - Cut membrane and reattach or install new nailing strip. Cover nailing strip with new flashing material.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
BASE FLASHING, COATED METAL						
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
=====	=====	=====	=====	=====	=====	=====
BCH1 - Holes in metal base flashing.	D/P/R			X		X
	D R		X		X	X
		D/P/R		X		X
		D		X		X
BCH2 - Holes in membrane joint cover or unbonding of membrane joint cover to metal base flashing allowing water to channel through.	D/P/R			X		X
	D R		X		X	X
		D/P/R		X		X
		D		X		X
BCH3 - Exposed gaps at top termination of the base flashing.	D/P/R			X		X
	D R		X		X	X
		D/P/R		X		X
		D		X		X



BCM1 - Membrane joint cover has become unbonded to metal base flashing but does not allow water to channel through.	D		X	X	X	X
BCM2 - Metal base flashing fasteners are loose.	D		X	X	X	X
BCM3 - Metal base flashing has pulled away from the wall or curb but top termination is water tight.	D		X	X	X	X
M&R activities as required:						
BCH1 - Cover holes with patches of flashing material or replace coated metal flashing section.	D/P/R D R		X	X	X	X
	D R	D R	X	X	X	X
BCH2 - Repair with new membrane material.	D/P/R D R		X	X	X	X
	D R	D R	X	X	X	X
BCH3 - Install additional base flashing fasteners, a termination bar, or an extension of the metal cap flashing.	D/P/R D R		X	X	X	X
	D R	D R	X	X	X	X
BCM1 - Reattach joint cover or cover with new membrane material.	D		X	X	X	X
BCM2 - Resecure or replace missing fasteners.	D		X	X	X	X
BCM3 - Cut roof membrane near base flashing and install additional membrane material to reduce tension.	D		X	X	X	X

METAL CAP FLASHING						
Inspect for:						
MCH1 - Metal coping cap or counterflashing is missing or displaced from its original position.	D/P/R D R		X X	X X	X X	X X
MCH2 - Corrosion holes have occurred through the metal on a horizontal surface.	D/P/R D R		X X	X X	X X	X X
MCH3 - Metal coping cap has missing joint covers where covers were originally installed.	D/P/R D R		X X	X X	X X	X X
MCM1 - Corrosion holes have occurred through the metal on a vertical surface.	D		X	X	X	X
MCM2 - Metal coping cap has loose fasteners, failure of soldered or sealed joints, open joints, or loss of attachment.	D		X	X	X	X
MCM3 - Sealant at reglet or top of counterflashing is missing or no longer functional, allowing water to channel behind counterflashing.	D		X	X	X	X
MCM4 - Counterflashing is loose at the top allowing water to channel behind it.	D		X	X	X	X
MCM5 - Metal cap flashing does not extend over top of base flashing.	D		X	X	X	X
MCM6 - Metal cap flashing has rough edges which are in contact with base flashing.	D		X	X	X	X

M&R activities as required:						
MCH1 - Reinstall displaced metal cap flashing or replace with new material.	D/P/R D R	D R	X	X	X	X
		D R	X	X	X	X
MCH2 - Replace metal cap flashing with new corrosion resistant material.	D/P/R D R	D R	X	X	X	X
		D R	X	X	X	X
MCH3 - Replace missing joint covers on metal coping cap.	D/P/R D R	D R	X	X	X	X
		D R	X	X	X	X
MCM1 - Clean and patch holes in metal cap flashing and coat entire surface with corrosion resistant paint.	D		X	X	X	X
MCM2 - Reseal failed joints in metal coping cap and reattach.	D		X	X	X	X
MCM3 - Remove faulty sealant at reglet or top of counterflashing and reseal.	D		X	X	X	X
MCM4 - Reinstall displaced counterflashing into its original position and fasten.	D		X	X	X	X
MCM5 - Add extension or replace counterflashing to cover top of base flashing.	D		X	X	X	X
MCM6 - Smooth rough edge, bend away from base flashing, or replace metal cap flashing if necessary.	D		X	X	X	X

EMBEDDED EDGE METAL						
Inspect for:						
EMH1 - Stripping material has holes, cuts or tears.	D/P/R D R	D/P/R D	X X	X X	X X	X X
EMH2 - Edge of stripping material is open and allows water to penetrate through.	D/P/R D R	D/P/R D	X X	X X	X X	X X
EMH3 - Splits in stripping material above joints.	D/P/R D R	D/P/R D	X X	X X	X X	X X
EMH4 - Holes have occurred through the metal.	D/P/R D R	D/P/R D	X X	X X	X X	X X
EMH5 - Loose or lifted metal with deterioration of the stripping material.	D/P/R D R	D/P/R D	X X	X X	X X	X X
EMH6 - Holes in the interior gutter.	D/P/R D R	D/P/R D	X X	X X	X X	X X
EMM1 - Stripping material is crazing, checked or cracked.	D		X	X	X	X
EMM2 - Edge of stripping material is open but does not allow water to penetrate through.	D		X	X	X	X
EMM3 - Nails under stripping material are backing out.	D		X	X	X	X

EMM4 - Corrosion of the metal or delamination of coating.	D			X	X	X	X
EMM5 - Loose or lifted metal without deterioration of the stripping material.	D			X	X	X	X
EMM6 - Hardened joint stripping material.	D			X	X	X	X
=====	=====	=====	=====	=====	=====	=====	=====
M&R activities as required:							
=====	=====	=====	=====	=====	=====	=====	=====
EMH1 - Cover affected area with new stripping material.	D/P/R				X		X
	D R			X		X	
		D R		X	X		X
		D		X		X	
EMH2 - Cover affected area with new stripping material.	D/P/R				X		X
	D R			X		X	
		D R		X	X		X
		D		X		X	
EMH3 - Cover affected area with new stripping material.	D/P/R				X		X
	D R			X		X	
		D R		X	X		X
		D		X		X	
EMH4 - Remove sections (10') of edge metal having holes and replace edge metal and stripping material.	D/P/R				X		X
	D R			X		X	
		D R		X	X		X
		D		X		X	
EMH5 - Refasten loose edge metal into solid support. Replace stripping material.	D/P/R				X		X
	D R			X		X	
		D R		X	X		X
		D		X		X	
EMH6 - Clean interior gutter to smooth bare metal. Line gutter with new membrane material.	D/P/R				X		X
	D R			X		X	
		D R		X	X		X
		D		X		X	
EMM1 - Cover affected material with new stripping material.	D			X	X	X	X

EMM2 - Reseal stripping material or cover affected area with new stripping material.	D		X	X	X	X
EMM3 - Remove loose nails in embedded edge metal and renail into solid support. Cover affected area with new stripping material.	D		X	X	X	X
EMM4 - Remove surface corrosion, prime and coat edge metal with corrosion resistant paint. Repair coated metal by covering with membrane material.	D		X	X	X	X
EMM5 - Re-nail loose edge metal flange into solid support. Cover flange with new stripping material.	D		X	X	X	X
EMM6 - Cover hardened joint stripping material with new stripping material.	D		X	X	X	X
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FLASHED PENETRATIONS						
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Inspect for:						
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FPH1 - Stripping material has holes, cuts or tears.	D/P/R			X		X
	D R	D/P/R	X	X	X	X
		D	X		X	
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FPH2 - Flashing sleeve or edge of stripping material is open and allows water to penetrate through.	D/P/R			X		X
	D R	D/P/R	X	X	X	X
		D	X		X	
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FPH3 - Holes, cuts, or tears in flashing sleeve or metal curb.	D/P/R			X		X
	D R	D/P/R	X	X	X	X
		D	X		X	
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FPH4 - No flashing sleeve present (where required).	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
FPH5 - Incompatible flashing material has been used.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
FPM1 - Stripping material is crazing, checked or cracked.	D		X	X	X	X
FPM2 - Flashing sleeve or edge of stripping material is open but does not allow water to penetrate through.	D		X	X	X	X
FPM3 - Top of flashing sleeve is not sealed or rolled inside existing plumbing vent stack. Clamping band is loose or missing (where required).	D		X	X	X	X
FPM4 - The sleeve or umbrella is open or no umbrella is present (where required).	D		X	X	X	X
FPM5 - Corrosion of metal or delamination of coating.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
FPH1 - Cover affected area with new stripping material.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
FPH2 - Cover affected area with new stripping material.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X

FPH3 - Remove damaged flashing sleeve or curb and replace.	D/P/R D R		X	X	X	X
		D R	X	X	X	X
FPH4 - Install missing flashing sleeves on flashed penetrations.	D/P/R D R		X	X	X	X
		D R	X	X	X	X
FPH5 - Remove dissimilar materials, clean affected area, and repair with new flashing material.	D/P/R D R		X	X	X	X
		D R	X	X	X	X
FPM1 - Cover affected area with new stripping material	D		X	X	X	X
FPM2 - Reseal stripping material or cover affected area with new stripping material.	D		X	X	X	X
FPM3 - Seal top of flashing sleeve around flashed penetration. Tighten clamping band or reinstall where missing.	D		X	X	X	X
FPM4 - Install an umbrella or weather hood on flashed penetrations.	D		X	X	X	X
FPM5 - Remove surface corrosion, prime and coat metal flashing with corrosion resistant paint. Repair coated metal by covering with membrane material.	D		X	X	X	X



PITCH PANS						
Inspect for:						
PPH1 - Stripping material has holes, cuts or tears.	D/P/R D R	D/P/R D	X X	X X	X X	X X
PPH2 - Edge of stripping material is open and allows water to penetrate through.	D/P/R D R	D/P/R D	X X	X X	X X	X X
PPH3 - Sealing material is below metal rim.	D/P/R D R	D/P/R D	X X	X X	X X	X X
PPH4 - Sealing material has cracked or separated from pan or penetration.	D/P/R D R	D/P/R D	X X	X X	X X	X X
PPH5 - Corrosion through the metal pan.	D/P/R D R	D/P/R D	X X	X X	X X	X X
PPM1 - Stripping material is crazing, checked or cracked.	D		X	X	X	X
PPM2 - Edge of stripping material is open but does not allow water to penetrate through.	D		X	X	X	X
PPM3 - Membrane has separated from metal pan.	D		X	X	X	X
PPM4 - Corrosion of metal or delamination of coating.	D		X	X	X	X

PPM5 - For EPDM and Hypalon, stripping material is not covering and tucked into pitch pan.	D			X	X	X	X
M&R activities as required:							
PPH1 - Cover affected area with new stripping material or replace pitch pan fill and stripping material if necessary.	D/P/R D R			X	X	X	X
		D R		X	X	X	X
PPH2 - Reseal stripping material or cover affected area with new stripping material.	D/P/R D R			X	X	X	X
		D R		X	X	X	X
PPH3 - Fill pitch pans with sealant and crown to assure water runoff.	D/P/R D R			X	X	X	X
		D R		X	X	X	X
PPH4 - Fill distressed pitch pans with sealant and crown to assure water runoff.	D/P/R D R			X	X	X	X
		D R		X	X	X	X
PPH5 - Remove all corrosion, prime and coat corroded pitch pans with corrosion resistant paint or replace damaged pitch pans.	D/P/R D R			X	X	X	X
		D R		X	X	X	X
PPM1 - Cover affected area with new stripping material or replace pitch pan fill and stripping material if necessary.	D			X	X	X	X
PPM2 - Cover affected area with new stripping material.	D			X	X	X	X
PPM3 - Cover affected area with new membrane material or replace pitch pan fill and stripping material if necessary.	D			X	X	X	X

PPM4 - Remove all corrosion, prime and coat corroded pitch pans with corrosion resistant paint or replace damaged pitch pans.	D		X	X	X	X
PPM5 - Remove pitch pan sealant and cover pitch pan with new stripping material which extends into pitch pan. Fill pitch pans with sealant and crown to assure water runoff.	D		X	X	X	X
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INTERIOR DRAINS AND ROOF LEVEL SCUPPERS						
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Inspect for:						
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DRH1 - Stripping material (PIB) has holes, cuts or tears.	D/P/R			X		X
	D R	D/P/R	X	X	X	X
		D	X		X	
DRH2 - Edge of stripping material is open and allows water to penetrate through.	D/P/R			X		X
	D R	D/P/R	X	X	X	X
		D	X		X	
DRH3 - Clamping ring is loose or missing from drain bowl or bolts are missing.	D/P/R			X		X
	D R	D/P/R	X	X	X	X
		D	X		X	
DRH4 - Drain is clogged.	D/P/R			X		X
	D R	D/P/R	X	X	X	X
		D	X		X	
DRH5 - Scupper metal is broken or holes have occurred through the metal.	D/P/R			X		X
	D R	D/P/R	X	X	X	X
		D	X		X	

DRH6 - Holes, cuts or abrasions through the membrane within 2 feet of the drain.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
DRM1 - Stripping material (PIB) is crazing, checked or cracked.	D		X	X	X	X
DRM2 - Edge of stripping material is open but does not allow water to penetrate through.	D		X	X	X	X
DRM3 - Strainer is broken or missing.	D		X	X	X	X
DRM4 - Scupper shows loss of protective coating or start of metal corrosion.	D		X	X	X	X
DRM5 - Drain has a field seam in clamping ring.	D		X	X	X	X
=====						
M&R activities as required:						
=====						
DRH1 - Cover affected area with new stripping material.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
DRH2 - Cover affected area with new stripping material.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
DRH3 - Reinstall loose or missing clamping ring on roof drains.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
DRH4 - Remove foreign material clogging roof drains.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X

DRH5 - Install new scuppers in place of broken or cracked scuppers.	D/P/R D R	D R	X	X	X	X
		D R	X	X	X	X
DRH6 - Cover affected area with patches of new membrane material.	D/P/R D R	D R	X	X	X	X
		D R	X	X	X	X
DRM1 - Cover affected area with new stripping material.	D		X	X	X	X
DRM2 - Reseal stripping material or cover affected area with new stripping material.	D		X	X	X	X
DRM3 - Install new drain strainers where broken or missing.	D		X	X	X	X
DRM4 - Remove all loose paint and corrosion around distressed scupper, prime and coat with corrosion resistant paint.	D		X	X	X	X
DRM5 - Remove clamping ring and cut out membrane in ring. Attach new membrane material (2ftx2ft), with center hole for drain, under existing membrane and attach. Replace clamping ring on new material.	D		X	X	X	X
SPLITS						
Inspect for:						
SPH1 - All splits are considered high severity due to their leak potential.	D/P/R D R	D/P/R D R	X	X	X	X
		D/P/R D	X	X	X	X

M&R activities as required:						
SPH1 - Cover splits with patches of new membrane material.	D/P/R D R		X	X	X	X
		D R	X	X	X	X
		D	X		X	
HOLES, CUTS, AND ABRASIONS						
Inspect for:						
HLH1 - Holes, cuts, gouges or abrasions which penetrate through the membrane.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
HLH2 - Holes through the membrane caused by underlying mechanical fasteners.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
HLM1 - Scratches, gouges or abrasions with loss of more than half of the membrane thickness but not fully penetrating the membrane.	D		X	X	X	X
M&R activities as required:						
HLH1 - Cover holes, cuts, and abrasions with patches of new membrane material.	D/P/R D R		X	X	X	X
		D R	X	X	X	X
		D	X		X	
HLH2 - Resecure or replace missing fastener and cover with patch of new membrane material.	D/P/R D R		X	X	X	X
		D R	X	X	X	X
		D	X		X	
HLM1 - Cover affected area with patch of new membrane material.	D		X	X	X	X

DEFECTIVE SEAMS						
Inspect for:						
DSH1 - Seam is unattached through entire width allowing water to penetrate the membrane.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
DSH2 - Fishmouths, wrinkling, or bunching at the seam allowing water to penetrate the membrane.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
DSM1 - Seam is unattached through more than 1/2 inch of width but not allowing water to penetrate the membrane.	D		X	X	X	X
DSM2 - Pinch wrinkle at the seam.	D		X	X	X	X
M&R activities as required:						
DSH1 - Re-adhere unattached seam or cover seams by applying patch of new membrane material.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
DSH2 - Cover seam irregularities by applying patch of new membrane material.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
DSM1 - Re-adhere unattached seam or cover affected area with patch of new membrane material.	D		X	X	X	X
DSM2 - Cover pinch wrinkle with patch of new membrane material.	D		X	X	X	X

SURFACE COATING DETERIORATION						
Inspect for:						
SCM1 - Area has lost coating protection.	D		X	X	X	X
M&R activities as required:						
SCM1 - Clean and recoat affected area.	D		X	X	X	X
SYSTEM SECUREMENT DEFICIENCIES						
Inspect for:						
SSH1 - For adhered systems, areas of unattached membrane or substrate greater than 100 sq. ft. (25 sq. ft. at building perimeter).	D/P/R D R	D/P/R D	X X	X X	X X	X X
SSH2 - For mechanically fastened systems, adjacent fasteners having missing or loose components or loss of attachment.	D/P/R D R	D/P/R D	X X	X X	X X	X X
SSH3 - For ballasted systems, bare areas of greater than 100 sq. ft. (25 sq. ft. at building perimeter).	D/P/R D R	D/P/R D	X X	X X	X X	X X
SSM1 - For fully adhered systems, areas of more than 4 sq. ft. but less than 100 sq. ft. (25 sq. ft. at building perimeter) of unattached membrane or substrate.	D		X	X	X	X



SSM2 - For mechanically attached systems, isolated mechanical fasteners having missing or loose components or loss of attachment.	D		X	X	X	X
SSM3 - For ballasted systems, bare areas of more than 4 but less than 100 sq. ft. (25 sq. ft. at building perimeter).	D		X	X	X	X
M&R activities as required:						
SSH1 - Cut open unbonded areas and re-adhere. If membrane cannot be re-adhered because of insulation deterioration, remove old insulation and install new.	D/P/R			X		X
	D R		X		X	X
		D R	X	X	X	X
		D				
SSH2 - Resecure or replace missing fasteners and components. Use slightly oversized fasteners or inserts. Cover fasteners and any holes with new membrane.	D/P/R			X		X
	D R		X		X	X
		D R	X	X	X	X
		D				
SSH3 - Re-distribute ballast to cover bare areas where possible. Wind force may require the use of pavers or design changes. Refer to a qualified designer.	D/P/R			X		X
	D R		X		X	X
		D R	X	X	X	X
		D				
SSM1 - Cut open unbonded areas and re-adhere. If membrane cannot be re-adhered because of insulation deterioration, remove old insulation and install new.	D		X	X	X	X

SSM2 - Resecure or replace missing fasteners and components. Use slightly oversized fasteners or inserts. Cover fasteners and any holes with new membrane.	D		X	X	X	X
SSM3 - Re-distribute ballast to cover bare areas where possible. Wind force may require the use of pavers or design changes. Refer to a qualified designer.	D		X	X	X	X
=====						
MEMBRANE SUPPORT						
=====						
Inspect for:						
MSM1 - Warped or bowed insulation boards have been broken or displaced.	D		X	X	X	X
=====						
M&R activities as required:						
=====						
MSM1 - Cut membrane and replace insulation. Repair membrane with new material.	D		X	X	X	X
=====						
PATCHING						
=====						
Inspect for:						
=====						
PAH1 - Other membrane distresses of high severity are present within the patched area.	D/P/R		X	X	X	X
	D R	D/P/R	X	X	X	X
		D	X		X	
=====						
PAH2 - Patches are made with roofing cement.	D/P/R			X		X
	D R	D/P/R	X		X	X
		D	X	X	X	
=====						
PAM1 - All other patches made with dissimilar materials.	D		X	X	X	X
=====						

=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
PAH1 - Cover distressed patches with new membrane material.	D/P/R			X		X
	D R			X	X	X
		D R		X		X
		D		X	X	X
-----	-----	-----	-----	-----	-----	-----
PAH2 - Remove roofing cement, clean affected area, and repair with patch of new membrane material.	D/P/R			X		X
	D R			X	X	X
		D R		X		X
		D		X	X	X
-----	-----	-----	-----	-----	-----	-----
PAM1 - Remove dissimilar materials, clean affected area, and repair with patch of new membrane material.	D			X	X	X
=====	=====	=====	=====	=====	=====	=====
DEBRIS AND VEGETATION						
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
=====	=====	=====	=====	=====	=====	=====
DVH1 - Vegetation growth which has penetrated or is damaging the membrane.	D/P/R			X		X
	D R			X	X	X
		D/P/R		X		X
		D		X	X	X
-----	-----	-----	-----	-----	-----	-----
DVH2 - Solvents, oil, or other chemicals causing holes in the membrane.	D/P/R			X		X
	D R			X	X	X
		D/P/R		X		X
		D		X	X	X
-----	-----	-----	-----	-----	-----	-----
DVM1 - Vegetation which does not appear to have damaged the membrane.	D			X	X	X
-----	-----	-----	-----	-----	-----	-----
DVM2 - Solvents, oil, or other chemicals causing degradation to the membrane.	D			X	X	X
-----	-----	-----	-----	-----	-----	-----
DVM3 - Foreign objects on the roof.	D			X	X	X
=====	=====	=====	=====	=====	=====	=====

M&R activities as required:						
DVH1 - Remove vegetation and repair with patch of new membrane material.	D/P/R D R	D R D	X X	X X	X X	X X
DVH2 - Remove contaminate and damaged membrane parts, repair with patch of new membrane material.	D/P/R D R	D R D	X X	X X	X X	X X
DVM1 - Clean surface of all dirt and vegetation.	D		X	X	X	X
DVM2 - Remove contaminants from roof membrane.	D		X	X	X	X
DVM3 - Remove foreign objects from the roof.	D		X	X	X	X
IMPROPER EQUIPMENT SUPPORTS						
Inspect for:						
EQH1 - Movement of support has cut or punctured the roof membrane.	D/P/R D R	D/P/R D	X X	X X	X X	X X
EQH2 - The equipment is bolted through the membrane and the bolts appear not to be sealed.	D/P/R D R	D/P/R D	X X	X X	X X	X X
EQM1 - Movement of the support has displaced the membrane or surfacing but has not cut or punctured it.	D		X	X	X	X
EQM2 - Equipment is bolted through the membrane but the bolts appear to be sealed.	D		X	X	X	X

=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
EQH1 - Repair damaged membrane under equipment support and install flashing device appropriate to the problem.	D/P/R D R		X	X	X	X
		D R	X	X	X	X
		D	X			
-----	-----	-----	-----	-----	-----	-----
EQH2 - Install pitch pans at support and flash into membrane.	D/P/R D R		X	X	X	X
		D R	X	X	X	X
		D	X			
-----	-----	-----	-----	-----	-----	-----
EQM1 - Replace improper equipment supports with devices allowing for movement of equipment.	D		X	X	X	X
-----	-----	-----	-----	-----	-----	-----
EQM2 - Install pitch pans at support and flash into membrane.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
PONDING						
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
=====	=====	=====	=====	=====	=====	=====
PDM1 - Ponding caused by wrinkles or folds in the membrane which are impeding drainage.	D		X	X	X	X
-----	-----	-----	-----	-----	-----	-----
PDM2 - Ponding caused by warping or bowing of the substrate beneath the membrane.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
PDM1 - If ballasted, wrinkles can usually be moved and dispersed evenly through area. As necessary cut membrane, remove wrinkles, and cover with patch of new membrane material.	D		X	X	X	X
-----	-----	-----	-----	-----	-----	-----

PDM2 - Cut membrane and repair or replace uneven substrate. Cover cuts with new membrane material.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
WET INSULATION						
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
=====	=====	=====	=====	=====	=====	=====
Remove wet roof insulation, inspect the deck, and repair. If necessary, replace the roofing system, including adjacent flashings.	D/P/R D R		X	X	X	X
	D/P/R D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====

# BUILT-UP ROOFING - MAINTENANCE & REPAIR

NOTE:

D = Deactivation

P = Periodic

R = Reactivation

Pfr = Preferred

Min = Minimal

yr = year

d = days

BASE FLASHING	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
BFH1 - Holes, splits, or tears in flashing caused by deterioration or physical damage.	D/P/R D R	D/P/R D	X X	X X	X X	X X
BFH2 - Exposed gaps at the top of the base flashing which are not covered by counterflashing or open side laps in the flashing which allow water to channel behind them.	D/P/R D R	D/P/R D	X X	X X	X X	X X
BFH3 - Grease, solvent, or oil drippings on the base flashing with deterioration of the felts.	D/P/R D R	D/P/R D	X X	X X	X X	X X
BFM1 - Slippage, wrinkling, blistering, or pulling of base flashing material.	D		X	X	X	X
BFM2 - Loss of surfacing with some deterioration of felts but no holes, splits, or tears.	D		X	X	X	X
BFM3 - Grease, solvent, oil drippings on the base flashing but no deterioration of felts.	D		X	X	X	X
BFM4 - Flashing has temporary repairs.	D		X	X	X	X

M&R activities as required:						
BFH1 - Repair damaged base flashing by overlaying each localized defect with new base flashing.	D/P/R D R		X	X	X	X
	D R		X	X	X	X
BFH2 - Install extension of counterflashing over exposed top termination of base flashing. Three course open side laps in base flashing.	D/P/R D R		X	X	X	X
	D R		X	X	X	X
BFH3 - Remove contaminate and affected base flashing material. Prime surface and install new base flashing.	D/P/R D R		X	X	X	X
	D R		X	X	X	X
BFM1 - Cut and re-secure unbonded base flashing, mechanically fasten slipped flashing and apply cold patch over all repairs.	D		X	X	X	X
BFM2 - Prime exposed and deteriorated base flashing and coat with heavy bodied asphalt coating.	D		X	X	X	X
BFM3 - Remove contaminates from undamaged base flashing, prime and coat areas with heavy bodied asphalt coating.	D		X	X	X	X
BFM4 - Remove temporary repair material from base flashing, reinforce patch as necessary and coat with heavy bodied asphalt coating.	D		X	X	X	X



METAL CAP FLASHING						
Inspect for:						
MCH1 - Metal coping cap or counterflashing is missing or displaced from its original position.	D/P/R D R	D/P/R D	X X	X X	X X	X X
MCH2 - Corrosion holes have occurred through the metal on a horizontal surface.	D/P/R D R	D/P/R D	X X	X X	X X	X X
MCH3 - Metal coping cap has missing joint covers where joint covers were originally installed.	D/P/R D R	D/P/R D	X X	X X	X X	X X
MCM1 - Corrosion holes have occurred through the metal on a vertical surface.	D		X	X	X	X
MCM2 - Metal coping cap has loose fasteners, failure of soldered joints, open joints, or loss of attachment.	D		X	X	X	X
MCM3 - Sealant at reglet or top of counterflashing is missing or no longer functioning, allowing water to channel behind it.	D		X	X	X	X
MCM4 - Counterflashing is loose at the top, allowing water to channel behind it.	D		X	X	X	X
MCM5 - Counterflashing does not extend over the top of the base flashing.	D		X	X	X	X

M&R activities as required:						
MCH1 - Reinstall displaced metal cap flashing or replace with new material.	D/P/R D R		X	X	X	X
	D R		X	X	X	X
MCH2 - Replace metal cap flashing with new corrosion resistant material.	D/P/R D R		X	X	X	X
	D R		X	X	X	X
MCH3 - Replace missing joint covers on metal coping cap.	D/P/R D R		X	X	X	X
	D R		X	X	X	X
MCM1 - Clean and patch holes in metal cap flashing and coat entire surface with corrosion resistant paint.	D		X	X	X	X
MCM2 - Reseal failed joints in metal coping cap and reattach.	D		X	X	X	X
MCM3 - Remove faulty sealant at reglet or top of counterflashing and reseal.	D		X	X	X	X
MCM4 - Reinstall displaced counterflashing into its original position and fasten.	D		X	X	X	X
MCM5 - Add extension or replace counterflashing to cover top of base flashing.	D		X	X	X	X
EMBEDDED EDGE METAL						
Inspect for:						
EMH1 - Stripping felts are missing or loose.	D/P/R D R		X	X	X	X
	D/P/R D		X	X	X	X

EMH2 - Splits in the stripping felts above the metal joints.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
EMH3 - Holes have occurred through the metal.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
EMH4 - Loose or lifted metal flange with deterioration of the stripping felts.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
EMH5 - Holes or joint movement are present in the interior gutter.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
EMM2 - Nails under the stripping felt are backing out.	D		X	X	X	X
EMM3 - Corrosion of the metal.	D		X	X	X	X
EMM4 - Loose or lifted metal flange without deterioration of the stripping felts.	D		X	X	X	X
=====						
M&R activities as required:						
=====						
EMH1 - Prime and three course edge metal flange in affected area.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
EMH2 - Place stripping felts and surfacing material over split areas.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
EMH3 - Remove sections (10') of edge metal having holes and replace.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X

EMH4 - Refasten loose edge metal flange into solid support. Replace stripping felts and surfacing material.	D/P/R D R		X	X	X	X
		D R	X	X	X	X
EMH5 - Clean interior of gutter to smooth bare metal. Line gutter with waterproof membrane.	D/P/R D R		X	X	X	X
		D R	X	X	X	X
EMM2 - Remove loose nails in embedded edge metal and renail into solid support. Three course over new fasteners.	D		X	X	X	X
EMM3 - Remove surface corrosion, prime and coat edge metal with corrosion resistant paint.	D		X	X	X	X
EMM4 - Re-nail loose edge metal flange into solid support. Three course over new fasteners.	D		X	X	X	X
FLASHED PENETRATIONS						
Inspect for:						
FPH1 - Flashing sleeve or metal curb has been installed with no stripping felts.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
FPH2 - Flashing sleeve or metal curb is cracked, broken, or corroded through.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
FPH3 - No flashing sleeve is present.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X

FPH4 - Penetration is not sealed at the membrane level.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
FPM1 - Edge of stripping felts is exposed but there is no apparent felt deterioration.	D		X	X	X	X
FPM2 - Top of flashing sleeve is not sealed or has not been rolled into existing plumbing vent stack.	D		X	X	X	X
FPM3 - The sleeve or umbrella is open or no umbrella is present (where required).	D		X	X	X	X
FPM4 - Metal is corroded.	D		X	X	X	X
=====						
M&R activities as required:						
FPH1 - Clean, prime and seal unflashed flanges on flashed penetrations.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
FPH2 - Remove damaged flashing sleeves or curbs and replace.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
FPH3 - Install missing flashing sleeves on flashed penetrations.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
FPH4 - Prime surface and three course unsealed flashed penetrations.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X

FPM1 - Restore surfacing over exposed stripping felts around flashed penetrations.	D		X	X	X	X
FPM2 - Seal top of flashing sleeves around flashed penetrations.	D		X	X	X	X
FPM3 - Install an umbrella or weather hood on flashed penetrations.	D		X	X	X	X
FPM4 - Remove surface corrosion, prime and coat with corrosion resistant paint on flashed penetrations.	D		X	X	X	X
PITCH PANS						
Inspect for:						
PPH1 - Metal Corrosion	D/P/R			X		X
	D R	D/P/R	X	X	X	X
PPH2 - Sealing material is below metal rim.	D/P/R			X		X
	D R	D/P/R	X	X	X	X
PPH3 - Stripping felts are exposed or deteriorated.	D/P/R			X		X
	D R	D/P/R	X	X	X	X
PPH4 - Sealing material has cracked or separated from pan or penetration.	D/P/R			X		X
	D R	D/P/R	X	X	X	X

M&R activities as required:						
PPH1 - Remove all corrosion prime and coat corroded pitch pans with corrosion resistant paint or replace damaged pitch pan.	D/P/R D R	D R	X	X	X	X
		D R	X	X	X	X
PPH2 - Fill pitch pans with sealant and crown to assure water runoff.	D/F/R D R	D R	X	X	X	X
		D R	X	X	X	X
PPH3 - Prime and three course pitch pans having deteriorated stripping felts.	D/P/R D R	D R	X	X	X	X
		D R	X	X	X	X
PPH4 - Fill distressed pitch pans with sealant and crown to assure water runoff.	D/P/R D R	D R	X	X	X	X
		D R	X	X	X	X
DRAINS AND ROOF LEVEL SCUPPERS						
Inspect for:						
DRH1 - Stripping felts have holes or are deteriorated.	D/P/R D R	D/P/R D	X	X	X	X
		D/P/R D	X	X	X	X
DRH2 - Clamping ring is loose or missing from drain body or bolts are missing.	D/P/R D R	D/P/R D	X	X	X	X
		D/P/R D	X	X	X	X
DRH3 - Drain is clogged.	D/P/R D R	D/P/R D	X	X	X	X
		D/P/R D	X	X	X	X
DRH4 - Scupper metal is broken or holes have occurred through the metal.	D/P/R D R	D/P/R D	X	X	X	X
		D/P/R D	X	X	X	X

DRM1 - Stripping felts are exposed but there is no apparent deterioration of felts.	D			X	X	X	X
DRM2 - Strainer is broken or missing.	D			X	X	X	X
DRM3 - Scupper shows loss of paint or protective coating or start of metal corrosion.	D			X	X	X	X
M&R activities as required:							
DRH1 - Remove deteriorated stripping felts around drains and scuppers, clean surface and prime. Replace stripping felt and restore surfacing material.	D/P/R				X		X
	D R			X		X	
		D R		X	X	X	X
		D					
DRH2 - Reinstall loose or missing clamping ring on roof drains.	D/P/R				X		X
	D R			X		X	
		D R		X	X	X	X
		D					
DRH3 - Remove foreign material clogging roof drains.	D/P/R				X		X
	D R			X		X	
		D R		X	X	X	X
		D					
DRH4 - Install new scuppers in place of broken or cracked scuppers.	D/P/R				X		X
	D R			X		X	
		D R		X	X	X	X
		D					
DRM1 - Prime and coat surface of roof drains having exposed stripping felts with heavy bodied asphalt coating.	D			X	X	X	X
DRM2 - Install new drain strainers where broken or missing.	D			X	X	X	X



DRM3 - Remove all loose paint and corrosion around distressed scupper, prime and coat with corrosion resistant paint.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
BLISTERS						
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
=====	=====	=====	=====	=====	=====	=====
BLH1 - The blisters are broken.	D/P/R D R	D/P/R D	X X	X X	X X	X X
=====	=====	=====	=====	=====	=====	=====
BLM1 - The felts are exposed or show deterioration.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
BLH1 - Remove broken blister, repair surface and restore surfacing material.	D/P/R D R	D R D	X X	X X	X X	X X
=====	=====	=====	=====	=====	=====	=====
BLM1 - Restore surfacing material on blisters which have exposed felts.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
RIDGING						
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
=====	=====	=====	=====	=====	=====	=====
RGH1 - Open breaks have developed in the ridge.	D/P/R D R	D/P/R D	X X	X X	X X	X X
=====	=====	=====	=====	=====	=====	=====
RGH2 - Felt deterioration has progressed through the top ply, exposing underlying plies.	D/P/R D R	D/P/R D	X X	X X	X X	X X
=====	=====	=====	=====	=====	=====	=====

RGM1 - The ridges are raised and clearly visible. The surfacing on the ridges is gone and the top felt is exposed.	D			X	X	X	X
M&R activities as required:							
RGM1 - Remove broken ridges repair membrane and restore surfacing material.	D/P/R			X	X	X	X
	D R	D R		X	X	X	X
		D		X		X	
RGH2 - Remove broken ridges repair membrane and restore surfacing material.	D/P/R			X	X	X	X
	D R	D R		X	X	X	X
		D		X		X	
RGM1 - Restore surfacing material on ridges which have exposed felts.	D			X	X	X	X
SPLITS							
Inspect for:							
SPH1 - An unrepaired split or a repaired split which has started to re-open.	D/P/R			X	X	X	X
	D R	D/P/R		X	X	X	X
		D		X		X	
M&R activities as required:							
SPH1 - Repair splits and restore surfacing material.	D/P/R			X	X	X	X
	D R	D R		X	X	X	X
		D		X		X	
HOLES							
Inspect for:							
HLH1 - All holes.	D/P/R			X	X	X	X
	D R	D/P/R		X	X	X	X
		D		X		X	

=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
HLH1 - Repair holes and restore surfacing.	D/P/R			X		X
	D R			X	X	X
		R		X		X
		D		X	X	X
=====	=====	=====	=====	=====	=====	=====
SURFACE DETERIORATION						
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
=====	=====	=====	=====	=====	=====	=====
SRH1 - On aggregate surfaced roofs, the aggregate cover has been displaced and the top coat of bitumen is exposed.	D/P/R			X		X
	D R			X	X	X
		D/P/R		X		X
		D		X	X	X
=====	=====	=====	=====	=====	=====	=====
SRH2 - On mineral surfaced-cap sheet roofs, the cap sheet felt is deteriorated.	D/P/R			X		X
	D R			X	X	X
		D/P/R		X		X
		D		X	X	X
=====	=====	=====	=====	=====	=====	=====
SRH3 - On smooth surfaced roofs, alligator cracks extend down through one or more plies.	D/P/R			X		X
	D R			X	X	X
		D/P/R		X		X
		D		X	X	X
=====	=====	=====	=====	=====	=====	=====
SRH4 - Shrinking of the walkway has torn the membrane below it.	D/P/R			X		X
	D R			X	X	X
		D/P/R		X		X
		D		X	X	X
=====	=====	=====	=====	=====	=====	=====
SRM1 - On aggregate surfaced roofs, the aggregate is displaced and the top coat of bitumen is exposed.	D			X	X	X
=====	=====	=====	=====	=====	=====	=====
SRM2 - On mineral surfaced-cap sheet roofs, the mineral granules have come off the cap sheet, exposing the underlying felt.	D			X	X	X
=====	=====	=====	=====	=====	=====	=====
SRM3 - On smooth surfaced roofs, no surface coating exists or there is a loss of surface coating.	D			X	X	X
=====	=====	=====	=====	=====	=====	=====

SRM4 - On smooth surfaced roofs, alligator cracks extend down through the bitumen to the top of the felt.	D			X	X	X	X
=====	=====	=====	=====	=====	=====	=====	=====
M&R activities as required:							
=====	=====	=====	=====	=====	=====	=====	=====
SRH1 - Repair deteriorated felts and restore surfacing aggregate.	D/P/R			X	X	X	X
	D R			X	X	X	X
		D R		X	X	X	X
SRH2 - Repair deteriorated membrane surfaces and restore surfacing material.	D/P/R			X	X	X	X
	D R			X	X	X	X
		D R		X	X	X	X
SRH3 - Repair affected area and coat surface with hot bitumen only.	D/P/R			X	X	X	X
	D R			X	X	X	X
		D R		X	X	X	X
SRH4 - Remove walkway, repair damaged membrane and replace walkway.	D/P/R			X	X	X	X
	D R			X	X	X	X
		D R		X	X	X	X
SRM1 - Reinstall aggregate on exposed membrane surfaces.	D			X	X	X	X
SRM2 - Restore granules on exposed surfaces.	D			X	X	X	X
SRM3 - Coat exposed surfaces with asphalt emulsion.	D			X	X	X	X
SRM4 - Remove excess asphalt in affected areas and coat with asphalt membrane.	D			X	X	X	X
=====	=====	=====	=====	=====	=====	=====	=====

SLIPPAGE						
Inspect for:						
SLH1 - More than 2 inch of slippage has occurred,	D/P/R			X		X
There is evidence of humping and wrinkling.	D R		X		X	
	D/P/R			X		X
	D		X		X	
M&R activities as required:						
SLH1 - Remove membrane irregularities in area of slippage, fasten and repair membrane and restore surfacing material.	D/P/R			X		X
	D R		X		X	
	D R		X		X	
	D		X		X	
PATCHING						
Inspect for:						
PAH1 - Ruptures or other membrane distresses are present within the patched area.	D/P/R			X		X
	D R		X		X	
	D/P/R			X		X
	D		X		X	
PAM1 - The materials and workmanship of the patch are not equal to or better than the existing membrane.	D		X	X	X	X
M&R activities as required:						
PAH1 - Replace distressed patches with material of same or better quality than existing membrane. Restore surfacing material.	D/P/R			X		X
	D R		X		X	
	D R		X		X	
	D		X		X	
PAM1 - Replace patches having inferior repair material with same or better quality than existing membrane. Restore surfacing material.	D		X	X	X	X

DEBRIS AND VEGETATION						
Inspect for:						
DVH1 - Grease, solvent, or oil drippings on the roof, causing degradation to the membrane.	D/P/R			X		X
	D R		X		X	
DVH2 - Vegetation roots that have penetrated the felts.	D/P/R			X		X
	D R		X		X	
DVM1 - The collection of foreign objects which are not removed from the roof during the inspection.	D/P/R			X		X
	D R		X		X	
DVM2 - Grease, solvent, or oil drippings on the roof which show no degradation of the roof membrane.	D/P/R			X		X
	D R		X		X	
DVM3 - Evidence of vegetation, but not penetrating the felts.	D/P/R			X		X
	D R		X		X	
M&R activities as required:						
DVH1 - Remove contaminate and effected parts of the roof system, repair membrane and restore surfacing material.	D/P/R			X		X
	D R		X		X	
DVH2 - Remove vegetation and effected areas of the membrane, repair membrane and restore surfacing material.	D/P/R			X		X
	D R		X		X	
DVM1 - Remove foreign objects from roof.	D/P/R			X		X
	D R		X		X	

DVM2 - Remove contaminated from undamaged roof membrane and restore surfacing material.			X	X	X	X
DVM3 - Clean surface of all dirt and vegetation.	D		X	X	X	X
IMPROPER EQUIPMENT SUPPORTS						
Inspect for:						
EQH1 - The support has caused damage to the roof membrane.	D/P/R			X		X
	D R	D/P/R	X	X	X	X
EQH2 - The equipment is bolted through the membrane and the bolts appear not to be water tight.	D/P/R			X		X
	D R	D/P/R	X	X	X	X
EQM1 - Movement of the support has caused displacement of the roof surfacing but has not damaged the membrane.	D		X	X	X	X
EQM2 - The equipment is bolted through the membrane and the bolts appear to be sealed.	D		X	X	X	X
M&R activities as required:						
EQH1 - Repair damaged membrane under equipment support, install flashing device appropriate to the problem.	D/P/R			X		X
	D R	D R	X	X	X	X
EQH2 - Install pitch pans at support and flash into membrane.	D/P/R			X		X
	D R	D R	X	X	X	X

EQM1 - Replace improper equipment supports with device allowing for movement of equipment.	D		X	X	X	X
EQM2 - Install pitch pans at unflashed supports and flash into membrane.	D		X	X	X	X
WET INSULATION						
M&R activities as required:						
Remove wet roof insulation, inspect the deck, and repair. If necessary, replace the roofing system, including adjacent flashings.	D/P/R D R	D R	X X	X X	X X	X X



# SHINGLE ROOFING - MAINTENANCE AND REPAIR

NOTE:

D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

STEP FLASHING	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
SFH1 - Holes in metal flashing caused by deterioration or physical damage.	D/P/R D R	D/P/R D	X	X	X	X
SFH2 - Exposed gaps at top of step flashing.	D/P/R D R	D/P/R D	X	X	X	X
SFH3 - Corrosion holes have occurred through the metal on roof level surface.	D/P/R D R	D/P/R D	X	X	X	X
SFM1 - Corrosion holes have occurred through the metal on a vertical surface.	D		X	X	X	X
SFM2 - Step flashing has temporary repairs.	D		X	X	X	X
M&R activities as required:						
SFH1 - Replace damaged step flashing.	D/P/R D R	D R D	X	X	X	X
SFH2 - Resecure loose step flashing and caulk with quality elastomeric sealant.	D/P/R D R	D R D	X	X	X	X

SFH3 - Replace damaged step flashing with new corrosion resistant material.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
SFM1 - Clean and patch hole in metal step flashing and coat entire surface with corrosion resistant paint	D		X	X	X	X
SFM2 - Perform appropriate repair for either vertical or roof level surface.	D		X	X	X	X
METAL CAP FLASHING						
Inspect for:						
MCH1 - Counterflashing is displaced or missing.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
MCH2 - Through metal corrosion on a horizontal surface.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
MCH3 - Metal coping cap has missing joint covers where covers were originally installed.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
MCM1 - Through metal corrosion on vertical surfaces.	D		X	X	X	X
MCM2 - Metal coping cap with loose fasteners, failure of sealed joints, open joints, loss of attachment.	D		X	X	X	X
MCM3 - Sealant at reglet or top of counterflashing is missing or no longer functional, allowing water to channel behind it.	D		X	X	X	X

MCM4 - Counterflashing is loose at top allowing water to channel behind it.	D			X	X	X	X
MCM5 - Counterflashing does not extend over step flashing.	D			X	X	X	X
M&R activities as required:							
MCH1 - Repair displaced flashing or install new flashing.	D/P/R				X		X
	D R			X		X	
	D R			X	X	X	X
MCH2 - Replace metal cap flashing with new corrosion resistant material.	D/P/R				X		X
	D R			X		X	
	D R			X	X	X	X
MCH3 - Replace missing joint covers on metal coping cap and reattach.	D/P/R				X		X
	D R			X		X	
	D R			X	X	X	X
MCM1 - Clean and patch holes in metal cap flashing and coat entire surface with corrosion resistant paint.	D			X	X	X	X
MCM2 - Reseal failed joints in metal coping cap and reattach.	D			X	X	X	X
MCM3 - Remove faulty sealant at reglet or top of counterflashing and reseal.	D			X	X	X	X
MCM4 - Reinstall displaced counterflashing into its original position and fasten.	D			X	X	X	X
MCM5 - Add extension or replace counterflashing to cover top of step flashing.	D			X	X	X	X

FLASHED PENETRATIONS						
Inspect for:						
FPH1 - Holes, cuts, or tears in flashing sleeve or metal curb.	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
FPH2 - No flashing sleeve present (where required).	D/P/R D R		X	X	X	X
		D/P/R D	X	X	X	X
FPM3 - Top of flashing sleeve is not sealed or rolled into the existing plumbing vent stack. Clamping band is loose or missing (where required).	D		X	X	X	X
FPM4 - The sleeve or umbrella is open or no umbrella is present (where required).	D		X	X	X	X
FPM5 - Corrosion of metal.	D		X	X	X	X
M&R activities as required:						
FPH1 - Remove damaged flashing sleeves or curbs and replace.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
FPH2 - Install missing flashing sleeves on flashed penetrations.	D/P/R D R		X	X	X	X
		D R D	X	X	X	X
FPM3 - Seal top of flashing sleeves around flashed penetrations.	D		X	X	X	X
FPM4 - Install an umbrella	D		X	X	X	X

or weather hood on flashed penetrations.						
FPM5 - Remove surface corrosion, prime and coat metal flashing with corrosion resistant paint.	D		X	X	X	X
VALLEY FLASHING						
Inspect for:						
VFH1 - For metal valley flashings, corrosion holes through the metal.	D/P/R D R		X	X	X	X
	D/P/R D		X	X	X	X
VFH2 - For mineral surfaced roll roofing valleys, end laps are separated or not sealed down.	D/P/R D R		X	X	X	X
	D/P/R D		X	X	X	X
VFH3 - Shingles have separated from valleys.	D/P/R D R		X	X	X	X
	D/P/R D		X	X	X	X
M&R activities as required:						
VFH1 - Isolated holes can be repaired with caulk or sheet metal and caulk. Extensive deterioration may require replacement of valley flashing.	D/P/R D R		X	X	X	X
	D R		X	X	X	X
	D		X	X	X	X
VFH2 - Apply liberal amounts of plastic cement between plies.	D/P/R D R		X	X	X	X
	D R		X	X	X	X
	D		X	X	X	X
VFH3 - Apply liberal amounts of plastic cement between shingles and flashing.	D/P/R D R		X	X	X	X
	D R		X	X	X	X
	D		X	X	X	X

CAULKING						
Inspect for:						
CAH1 - Deteriorated, split, or missing caulk on flashing or counterflashing.	D/P/R D R		X	X	X	X
M&R activities as required:	D/P/R D		X	X	X	X
CAH1 - Remove old caulk, clean, and apply elastomeric sealant.	D/P/R D R		X	X	X	X
	D R		X	X	X	X
CLAWING						
Inspect for:						
CLM1 - Shingle is clawed and center of tab is raised more than 1/4 inch.	D		X	X	X	X
M&R activities as required:						
CLM1 - No repair. Extensive clawing may require roof replacement in the near future.	D		X	X	X	X
IMPROPER NAILING / NAIL REJECTION						
Inspect for:						
INM1 - Nails pushing up on shingle above head.	D		X	X	X	X
M&R activities as required:						
INM1 - Remove accessible nails (under tab), seal hole with plastic cement, and re nail in new location.	D		X	X	X	X

BREAKAGE/DAMAGE						
Inspect for:						
BRH1 - Breakage or deterioration of shingles extending beyond the tabs.	D/P/R D R	D/P/R D	X	X	X	X
			X	X	X	X
BRM1 - Granule loss or vegetation resulting in deterioration of shingle.	D		X	X	X	X
BRM2 - Wind, traffic, or hail damage to tabs only. Missing tabs.	D		X	X	X	X
M&R activities as required:						
BRH1 - Replace isolated damaged shingles. Extensive problems may require roof replacement.	D/P/R D R	D R D	X	X	X	X
			X	X	X	X
BRM1 - Replace isolated broken shingles. Extensive damage may require roof replacement.	D		X	X	X	X
BRM2 - Replace isolated broken shingles. Extensive damage may require roof replacement.	D		X	X	X	X
BLISTERING						
Inspect for:						
BLM1 - Open blister on shingle	D		X	X	X	X

M&R activities as required:						
BLM1 - Apply mastic.	D		X	X	X	X
LOOSE TABS						
Inspect for:						
LTM1 - Tab seal strip has not adhered to underlying shingle.	D		X	X	X	X
M&R activities as required:						
LTM1 - Carefully lift loose tab, place plastic cement underneath tabs, and press in place.	D		X	X	X	X
ICE DAMS						
Inspect for:						
IDM1 - Damage to eave and/or lowest courses of shingles which is attributable to ice damming.	D		X	X	X	X
M&R activities as required:						
IDM1 - Repair of this problem may require placement of an ice shield under the shingles from the eave extending 3 to 6 feet up slope. Ventilation improvements may also be desirable.	D		X	X	X	X



=====	=====	=====	=====	=====	=====	=====
DEBRIS AND VEGETATION						
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
=====	=====	=====	=====	=====	=====	=====
DVM2 - Foreign objects on the roof or gutters.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
DVM2 - Remove foreign objects from the roof.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
IMPROPER EQUIPMENT SUPPORTS (includes water diverters)						
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
=====	=====	=====	=====	=====	=====	=====
EQH1 - Movement of support has caused damage to the shingles.	D/P/R D R		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
		D/P/R D	X	X	X	X
=====	=====	=====	=====	=====	=====	=====
EQM1 - The equipment is bolted through the shingles and the bolts appear not to be sealed.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
EQH1 - Repair damaged shingles under equipment support and install flashing device appropriate to the problem.	D/P/R D R		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
		D R D	X	X	X	X
=====	=====	=====	=====	=====	=====	=====
EQM1 - Caulk unflashed penetrations with elastometric sealant.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====

## **APPENDIX C:**

### **INSPECTION AND M&R CHECKLISTS FOR EXTERIOR CLOSURE**

#### **General Notes on Structure**

##### *Structural Components*

Failures occurring during the normal life expectancy of buildings and structures should be carefully investigated, and the fundamental defects corrected prior to superficial repair.

If the cause of the failure is not immediately discernible, or if the corrective measures are not straightforward or standard, consultation and advice should be obtained from qualified architects or structural engineers. Most of the defects listed for the structural components could result from a number of mechanisms; the cause and extent of deterioration may simply be unknown.

The architect or engineer should determine the cause of the deterioration and the strength of the existing structure and then provide recommendations on how to proceed. These recommendations may include:

1. To permit deterioration to continue
2. To take measures to preserve the structure in its present condition without any attempt to strengthen it
3. To strengthen the construction
4. To reconstruct or abandon the construction, if deterioration is exceptionally severe.

The decision should be rendered on the basis of safety, economics, and appearance.

##### *Cracks*

Before any attempt is made to repair a crack, an investigation should be undertaken to determine the cause of the crack. The following precautions should be observed:

1. Do not attempt to repair cracks as soon as they appear. Observe the cracks periodically over time to determine whether the crack is active or passive. Determine the cause of the crack and correct it.
2. Do not attempt to repair a fine crack by chiseling out a deep groove and repointing. Repair fine cracks by filling or bridging over with a cement-based wash or paint.
3. Do not caulk cracks above grade with light plastic or dark bituminous caulking compounds that will contrast with the wall finish. If such materials must be used, seal the caulking by coating with a shellac or aluminum paint, then paint to match the surrounding area.

### *Holes*

Take immediate corrective measures if holes are of a size or depth that may cause substrate deterioration or permit water penetration.

### *Concrete Masonry Walls and Retaining Walls*

For bowing and bulging and out-of-plumb concrete masonry walls and retaining walls, note that general deviations from the vertical and horizontal in excess of 1/240 of the unsupported length, or 0.5 in. per 10 ft,\* are likely to be noticed and should be investigated by a qualified architect or structural engineer.

### *General Notes on Painting*

When corrosion is removed from a surface, that surface must receive touch-up paint.

Existing paint coatings may contain lead, which is a hazardous material. Special precautions must be taken when working with or around such coatings.

If pitting corrosion is present, remove corrosion, spot prime, and topcoat entire surface. If pitting corrosion continues, determine cause of corrosion and fix the condition before performing any further M&R.

### *Exterior Metal*

#### *Preferred Maintenance:*

Perform surface preparation of general corrosion covering 1 percent or more, and any pitted corrosion.

#### *Minimal Maintenance:*

Perform surface preparation of general corrosion covering 3 percent or more, and any pitted corrosion.

### *Exterior Concrete*

#### *Preferred Maintenance:*

Perform surface preparation of deteriorated coatings covering 3 percent or more of the surface.

#### *Minimal Maintenance:*

Where noted, perform surface preparation of deteriorated coatings covering 10 percent or more of the surface.

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\*U.S. standard units of measure are used in this report. A metric conversion table can be found on page 8.

### ***Exterior Wood***

#### **Preferred Maintenance:**

Where noted, perform surface preparation of deteriorated coatings covering 3 percent or more of the surface.

#### **Minimal Maintenance:**

Where noted, perform surface preparation of deteriorated coatings covering 7 percent or more of the surface.

### ***Exterior Concrete Masonry Unit***

#### **Preferred Maintenance:**

Perform surface preparation of deteriorated coatings covering 3 percent or more of the surface.

#### **Minimal Maintenance:**

Perform surface preparation of deteriorated coating covering 10 percent or more of the surface.

### **Checklist Contents**

The exterior closure component consists of the architectural and structural elements of the building envelope, plus the exterior elements immediately adjacent to the building. Its subcomponents are Exterior Perimeter, Exterior Wall, Windows and Louvers, and Doors.

#### ***Exterior Perimeter***

- Sidewalks, Stoops, & Steps
- Finish Grade
- Trees & Shrubs
- Concrete Stairs & Retaining Walls
- Steel Guardrails, Handrails, & Stairs
- Wood Guardrails, Handrails, & Stairs
- Metal Grates
- Caulking
- Area Drains & Catch Basins
- Vehicle Bumper Guards: Steel, Wood, & Concrete
- Deck Bumpers
- Exterior Signs
- Security Fencing

#### ***Exterior Wall***

- Concrete Surfaces
- Cementitious Coating
- Concrete Masonry Units
- Brick Masonry Units
- Exterior Ceramic Tile
- Metal Cladding & Metal Panels

Vinyl Cladding  
Wood Cladding  
Lintels & Sills: Steel, Precast Concrete, & Reinforced Concrete Masonry Units  
Miscellaneous Metal, Ladders, Security Grilles, Corner Guards, Flagpoles, Metal Fascia & Soffits,  
Metal Canopies & Supports  
Identifying Devices: Exterior Signs, Lettering, & Attachments  
Gutters & Downspouts  
Flashing & Counterflashing  
Caulking

*Exterior Windows and Louvers*

Glass & Glazing  
Steel Windows  
Aluminum Windows  
Vinyl-Clad Wood Windows  
Metal-Clad Wood Windows  
Wood Windows  
Window Hardware  
Metal Louvers & Metal Grilles  
Window Screens  
Caulking

*Exterior Doors*

Hollow Metal Doors & Frames; Steel Doors & Frames  
Metal Coiling Doors & Metal Sectional Overhead Doors  
Sectional Overhead Doors: Wood Panels  
Wood Doors & Frames  
Steel & Glass Doors & Frames  
Aluminum & Glass Doors & Frames  
Screen Doors  
Glass in Doors  
Louvers in Doors  
Door Hardware  
Caulking

# GENERAL BUILDING TYPES

## EXTERIOR CLOSURE - EXTERIOR PERIMETER

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

SIDEWALKS, STOOPS, & STEPS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks & holes	D/P/R R	R	X X	X X	X X	X X
Spalling & scaling	D/P/R R	R	X X	X X	X X	X X
Uneven settlement	D/P/R R	R	X X	X X	X X	X X
Tripping & slipping hazards	D/P/R	D R D/P/R	X X	X X	X X	X X
Exposed reinforcing	D/P/R	R	X	X	X	X
Damaged expansion joints	D/P/R	R	X	X	X	X

M&R activities as required:						
Repair cracks & holes	D/P/R R		X	X	X	X
		R	X	X	X	X
Replace damaged sections	D/P/R R		X	X	X	X
		R	X	X	X	X
Replace sections that cause tripping hazards; clean off slipping hazards	D/P/R D R D/P/R		X	X	X	X
			X	X	X	X
Clean rebar & adjacent concrete; coat rebar, patch area	D/P/R	R	X	X	X	X
Replace rebar; clean adjacent concrete, patch area	D/P/R	R	X	X	X	X
Repair or replace damaged expansion joints	D/P/R	R	X	X	X	X

FINISH GRADE	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Slope towards building	D/P/R	D R D/P/R	X X	X X	X X	X X
Water accumulation at building	D/P/R	D R D/P/R	X X	X X	X X	X X
M&R activities as required:						
Slope grade away from building	D/P/R	D R D/P/R	X X	X X	X X	X X
Provide dam or trench to prevent accumulation at building	D/P/R	D R D/P/R	X X	X X	X X	X X

TREES & SHRUBS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Building contact by trees, branches, shrubs, or vegetative growth	D/P/R	D R D/P/R	X X	X X	X X	X X
M&R activities as required:						
Remove or trim all tree, shrub, & vegetative growth in contact with building	D/P/R	D R D/P/R	X X	X X	X X	X X



CONCRETE STAIRS & RETAINING WALLS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks & holes	D/P/R		X	X	X	X
	R		X	X	X	X
Spalling & scaling	D/P/R		X	X	X	X
	R		X	X	X	X
Movement	D/P/R		X	X	X	X
	D R		X	X	X	X
	D/P/R			X		X
Tripping & slipping hazards	D/P/R		X	X	X	X
	D R		X	X	X	X
	D/P/R			X		X
Exposed reinforcing	D/P/R		X	X	X	X
	D R		X	X	X	X
	D/P/R			X		X
Damaged expansion joints	D/P/R		X	X	X	X
	D R		X	X	X	X
	D/P/R			X		X
Clogged weep holes	D/P/R		X	X	X	X
	D R		X	X	X	X
	D/P/R			X		X

M&R activities as required:						
Repair cracks, chips, & holes	D/P/R R	R	X X	X X	X X	X X
Replace damaged sections	D/P/R R	R	X X	X X	X X	X X
Replace sections that cause tripping hazards; clean off slipping hazards	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Clean rebar & adjacent concrete; coat rebar, patch area	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Replace rebar; clean adjacent concrete, patch area	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Repair or replace damaged expansion joints	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Consult with engineer for movement correction procedure	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Rod out clogged weep holes	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X

STEEL GUARDRAILS, HANDRAILS, & STAIRS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, holes, dents, & deformation	D/P/R		X	X	X	X
	R	R	X	X	X	X
Corrosion	D/P/R		X	X	X	X
	D R	D R	X	X	X	X
	D/P/R	D/P/R		X		X
Staining & discoloration	D/P/R		X	X	X	X
	R	R	X	X	X	X
Loose, broken, or missing sections & fasteners	D/P/R		X	X	X	X
	D R	D R	X	X	X	X
	D/P/R	D/P/R		X		X
Surface coat damage	D R D R	D R D R	X	X	X	X
	D/P/R D/P/R	D/P/R D/P/R		X		X

M&R activities as required:						
Repair cracks, holes, dents, & deformation	D/P/R R		X	X	X	X
		R	X	X	X	X
Remove corrosion	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Secure loose sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace broken or missing sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean off surfaces stains & discoloration	D/P/R R		X	X	X	X
		R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare surface & paint	D R D/P/R	D R D/P/R	X	X	X	X

WOOD GUARDRAILS, HANDRAILS, & STAIRS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, splits, & holes	D/P/R	D R D/P/R	X X	X X	X X	X X
Gouges	D/P/R R	R	X X	X X	X X	X X
Rot	D/P/R	D R D/P/R	X X	X X	X X	X X
Staining & discoloration	D/P/R R	R	X X	X X	X X	X X
Insect infestation	D/P/R	D R D/P/R	X X	X X	X X	X X
Fungal growth	D/P/R	D R D/P/R	X X	X X	X X	X X
Warped sections	D/P/R R	R	X X	X X	X X	X X
Loose, broken, or missing sections & fasteners	D/P/R	D R D/P/R	X X	X X	X X	X X
Surface coat damage	D R D/P/R	D D/P/R	X	X	X	X

M&R activities as required:						
Seal cracks, splits, & holes	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X
Repair or replace gouged areas	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Replace rotted sections	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X
Replace warped sections	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Secure loose sections & fasteners	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X
Replace broken or missing sections & fasteners	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X
Eradicate insect infestation	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X
Clean off fungus growth	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X
Clean off surface stains & discoloration	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare surface & paint	D R D		X		X	
	D/P/R D/P/R			X		X

METAL GRATES	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, dents, & deformation	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Loose, broken, or missing sections & fasteners	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Surface coat damage	D R D R D/P/R D/P/R	D R D/P/R	X X	X X	X X	X X
M&R activities as required:						
Repair cracks, dents, & deformations	D/P/R R	R	X X	X X	X X	X X
Remove corrosion	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Secure loose sections & fasteners	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Replace broken or missing sections & fasteners	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Clean off surface stains & discoloration	D/P/R R	R	X X	X X	X X	X X
Prepare surface & paint	D R D R D/P/R D/P/R	D R D/P/R	X X	X X	X X	X X

CAULKING	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Loose caulk	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Missing caulk	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Eroded caulk	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
M&R activities as required:						
Remove loose, eroded, or damaged caulk, clean surfaces, recaulk	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X



AREA DRAINS & CATCH BASINS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Clogging debris	D/P/R	D R D/P/R	X X	X X	X X	X X
Standing water	D/P/R	D R D/P/R	X X	X X	X X	X X
Cracks & deformation	D/P/R R	R	X X	X X	X X	X X
Loose sections	R	R	X	X	X	X
Loose, broken, or missing sections	D/P/R	D R D/P/R	X X	X X	X X	X X
M&R activities as required:						
Remove debris	D/P/R	D R D/P/R	X X	X X	X X	X X
Rout out drain	D/P/R	D R D/P/R	X X	X X	X X	X X
Repair cracks & deformation	D/P/R R	R	X X	X X	X X	X X
Secure loose sections	R	R	X	X	X	X
Replace broken or missing sections	D/P/R	D R D/P/R	X X	X X	X X	X X

=====	=====	=====	=====	=====	=====	=====
VEHICLE BUMPER GUARDS: STEEL, WOOD, & CONCRETE	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	R<45d	R<45d	R>45d	R>45d
Inspect for:	=====	=====	=====	=====	=====	=====
Cracks, dents, & deformation	D/P/R R		X	X	X	X
		R	X	X	X	X
Corrosion	D/P/R R		X	X	X	X
		R	X	X	X	X
Rot	D/P/R R		X	X	X	X
		R	X	X	X	X
Spalling & scaling	D/P/R R		X	X	X	X
		R	X	X	X	X
Loose, broken, or missing sections & fasteners	D/P/R	R	X	X	X	X
Surface coat damage	D R D R D/P/R D/P/R		X	X	X	X
M&R activities as required:	=====	=====	=====	=====	=====	=====
Repair cracks, dents, & deformation	D/P/R R		X	X	X	X
		R	X	X	X	X
Remove corrosion	D/P/R R		X	X	X	X
		R	X	X	X	X
Secure loose sections & fasteners	D/P/R	R	X	X	X	X
Replace broken or missing sections & fasteners	D/P/R	R	X	X	X	X
Prepare surface & paint	D R D R D/P/R D/P/R		X	X	X	X
=====	=====	=====	=====	=====	=====	=====

DOCK BUMPERS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Loose, broken, or missing sections & fasteners	D/P/R	R	X	X	X	X
Surface coat damage	D R D/P/R	R R	X	X	X	X
M&R activities as required:						
Remove wood/steel bumpers	D	D		X		X
Reinstall wood/steel bumpers	R	R		X		X
Secure loose sections & fasteners	D/P/R R	R	X X	X X	X X	X X
Replace rotted, broken, or missing sections & fasteners	D/P/R R	R	X X	X X	X X	X X
Prepare surface & paint	D R D/P/R	R R	X	X	X	X

=====	=====	=====	=====	=====	=====	=====
EXTERIOR SIGNS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	R<45d	R<45d	R>45d	R>45d
Inspect for:						
Loose, broken, missing, or damaged signs	D/P/R R		X	X		
		R	X	X	X	X
M&R activities as required:						
Repair or replace signs	D/P/R R		X	X		
		R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

=====	=====	=====	=====	=====	=====	=====
SECURITY FENCING	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	R<45d	R<45d	R>45d	R>45d
Inspect for:						
Holes & penetrations	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Continuity of barbed wire or tape	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Stability of vertical supports	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
M&R activities as required:						
Replace damaged fence area or barbed wire/tape	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Reset vertical support	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
=====	=====	=====	=====	=====	=====	=====

# GENERAL BUILDING TYPES

## EXTERIOR CLOSURE - EXTERIOR WALL

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

CONCRETE SURFACES	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks & holes	D/P/R	D R D/P/R	X X	X X	X X	X X
Chips & gouges	D/P/R R	R	X X	X X	X X	X X
Spalling & scaling	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration	D/P/R R	R	X X	X X	X X	X X
Efflorescence; locate source of water penetration	D/P/R	R	X	X	X	X
Exposed reinforcing	D/P/R	D R D/P/R	X X	X X	X X	X X
Damaged expansion joints	D/P/R	D R D/P/R	X X	X X	X X	X X
Surface coat damage	D R D/P/R	D R	X	X	X	X

M&R activities as required:						
Repair cracks & holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Repair chips & gouges	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Repair spalled or scaled area	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Clean rebar & adjacent concrete; coat rebar, patch area	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace rebar; clean adjacent concrete, patch area	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Repair expansion joints	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean off surface stains & discoloration	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Clean off efflorescence	D/P/R	R	X	X	X	X
Prepare & paint surfaces	D R	D R	X		X	
	D/P/R	D R		X		X

CEMENTITIOUS COATING	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks & holes	D/P/R	D R D/P/R	X X	X X	X X	X X
Chips & gouges	D/P/R R	R	X X	X X	X X	X X
Spalling & scaling	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration	D/P/R R	R	X X	X X	X X	X X
Efflorescence; locate source of water penetration	D/P/R	R	X	X	X	X
Damaged expansion joints	D/P/R	D R D/P/R	X X	X X	X X	X X
Surface coat damage	D R D D/P/R D R		X	X	X	X

M&R activities as required:						
Repair cracks & holes	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Repair chips & gouges	D/P/R		X	X		
	R				X	X
		D R	X	X	X	X
Repair spalled or scaled area	D/P/R		X	X		
	R				X	X
		D R	X	X	X	X
Repair expansion joints	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Clean off surface stains & discoloration	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Clean off efflorescence	D/P/R		X	X	X	X
Prepare & paint surfaces	D R	D	X		X	
	D/P/R	D R		X		X



CONCRETE MASONRY UNITS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks & holes	D/P/R	D R D/P/R	X X	X X	X X	X X
Chips & gouges	D/P/R R	R	X X	X X	X X	X X
Broken or missing units	D/P/R	D R D/P/R	X X	X X	X X	X X
Cracked, broken, loose, or crumbling mortar	D/P/R	D R D/P/R	X X	X X	X X	X X
Missing mortar	D/P/R	D R D/P/R	X X	X X	X X	X X
Bowing or bulging*	D/P/R	D R D/P/R	X X	X X	X X	X X
Out of plumb*	D/P/R	D R D/P/R	X X	X X	X X	X X
Staining & discoloration	D/P/R R	R	X X	X X	X X	X X
Efflorescence; locate source of water penetration	D/P/R	R	X	X	X	X
Damaged expansion joints	D/P/R	D R D/P/R	X X	X X	X X	X X

NOTE: The items marked with an asterisk (\*) can develop into a serious structural problem. If the cause of the defect or local failure is not immediately discernible or if the corrective measures are not straightforward, consultation and advice should be obtained from a qualified architect or structural engineer.

Clogged weep holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Surface coat damage	D R	D R	X	X	X	X
	D/P/R	D R		X		X
M&R activities as required:						
Repair cracks & holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Repair chips & gouges	D/P/R		X	X	X	X
	R	R	X	X	X	X
Replace broken or missing units	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Remove cracked, broken, loose, or crumbling mortar; tuckpoint joints	D/P/R	R	X	X	X	X
Seal cracked, broken, or loose mortar with caulk		D	X	X	X	X
		D/P		X		X
Tuckpoint mortar gaps	D/P/R	R	X	X	X	X
Caulk in mortar gaps		D	X	X	X	X
		D/P		X		X

Tie wall back to main structure	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Reconstruct failed area	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Repair damaged expansion joints	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean-out weep holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean off surface stains & discoloration	D/P/R	R	X	X	X	X
		R	X	X	X	X
Clean off efflorescence	D/P/R	R	X	X	X	X
		R	X	X	X	X
Prepare & paint surfaces	D R	D R	X	X	X	X
	D/P/R	D R	X	X	X	X

BRICK MASONRY UNITS	Pfr	Min	D<1yr	D>1yr	R<45d	R>45d
Inspect for:						
Cracks & holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Chips & gouges	D/P/R	R	X	X	X	X
		R	X	X	X	X
Broken or missing units	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Spalling & scaling	D/P/R	R	X	X	X	X
		R	X	X	X	X
Cracked, broken, loose, or crumbling mortar	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Missing mortar	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Bowing or bulging*	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Out of plumb*	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Staining & discoloration	D/P/R	R	X	X	X	X
		R	X	X	X	X
Efflorescence; locate source of water penetration	D/P/R	R	X	X	X	X

Damaged expansion joints	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Control joints	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clogged weep holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
Repair cracks & holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Repair chips & gouges	D/P/R	R	X	X	X	X
		R	X	X	X	X
Replace broken or missing units	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Repair spalled or scaled area	D/P/R	R	X	X	X	X
		R	X	X	X	X
Remove cracked, broken, loose, or crumbling mortar; tuckpoint joints	D/P/R	R	X	X	X	X
Seal cracked, broken, or loose mortar with caulk	D/P/R	D/P	X	X	X	X
Tuckpoint mortar gaps	D/P/R	R	X	X	X	X
Caulk in mortar gaps	D/P/R	D/P	X	X	X	X
Tie wall back to main structure	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X

Reconstruct failed area	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Repair damaged expansion joints	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Clean-out weep holes	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Clean control joints	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Clean off surface stains & discoloration	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Clean off efflorescence	D/P/R	R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

=====	=====	=====	=====	=====	=====	=====
EXTERIOR CERAMIC TILE	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	=====	=====	=====	=====
Inspect for:			R<45d	R<45d	R>45d	R>45d
=====	=====	=====	=====	=====	=====	=====
Cracks, chips, holes, & gouges	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Staining & discoloration	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Loose, broken, or missing tiles	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Loose or missing grout	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
Repair cracks, chips, holes, & gouges	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Grout-in loose tiles	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Replace broken or missing tiles	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Remove loose grout, regrout joints	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Clean off surface stains & discoloration	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

METAL CLADDING & METAL PANELS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, holes, dents, & gouges	D/P/R	D R D/P/R	X X	X X	X X	X X
Staining & discoloration	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R	D R D/P/R	X X	X X	X X	X X
Deformed sections	D/P/R R	R	X X	X X	X X	X X
Loose, broken, or missing sections & fasteners	D/P/R	D R D/P/R	X X	X X	X X	X X
Surface coat damage	D R D/P/R	D R D/P/R	X	X	X	X
M&R activities as required:						
Patch small cracks & holes; replace sections with large cracks & holes	D/P/R	D R D/P/R	X X	X X	X X	X X
Replace sections with dents or gouges	D/P/R R	R	X X	X X	X X	X X
Remove corrosion	D/P/R	D R D/P/R	X X	X X	X X	X X
Replace deformed sections	D/P/R R	R	X X	X X	X X	X X



Secure loose sections & fasteners	D/P/R		X	X	X	X
	D	R	X		X	
	D/P/R			X		X
Replace broken or missing sections & fasteners	D/P/R		X	X	X	X
	D	R	X		X	
	D/P/R			X		X
Clean off surface stains & discoloration	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Prepare & paint surfaces	D	R	X		X	
	D/P/R	D/P/R		X		X
=====	=====	=====	=====	=====	=====	=====

VINYL CLADDING	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks & holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Staining & discoloration	D/P/R	R	X	X	X	X
		R	X	X	X	X
Deformed sections	D/P/R	R	X	X	X	X
		R	X	X	X	X
Loose, broken, or missing sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
M&R activities as required:						
Patch small cracks & holes; replace sections with large cracks & holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace deformed sections	D/P/R	R	X	X	X	X
		R	X	X	X	X
Secure loose sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace broken or missing sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean off surface stains & discoloration	D/P/R	R	X	X	X	X
		R	X	X	X	X

WOOD CLADDING	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, splits, & holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Gouges	D/P/R		X	X	X	X
	R	R	X	X	X	X
Rot	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Staining & discoloration	D/P/R		X	X	X	X
	R	R	X	X	X	X
Insect infestation	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Fungal growth	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Warped sections	D/P/R		X	X	X	X
	R	R	X	X	X	X
Loose, broken, or missing sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Surface coat damage	D R	D R	X	X	X	X
	D/P/R	D R	X	X	X	X

M&R activities as required:						
Seal cracks, splits, & holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Repair or replace gouged areas	D/P/R	R	X	X	X	X
		R	X	X	X	X
Replace rotted sections	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace warped sections	D/P/R	R	X	X	X	X
		R	X	X	X	X
Secure loose sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace broken or missing sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Eradicate insect infestation	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean off fungus growth	D/P/R	R	X	X	X	X
		R	X	X	X	X
Clean off surfaces stains & discoloration	D/P/R	R	X	X	X	X
		R	X	X	X	X
Prepare & paint surfaces	D R	D R	X	X	X	X
	D/P/R	D R	X	X	X	X

LINTELS & SILLS: STEEL, PRECAST CONCRETE, & REINFORCED CMU	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Corrosion	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Cracks, chips, holes, & gouges	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Surface coat damage	D R	D R	X	X	X	X
	D/P/R	D/P/R				
Sagging, displacement or misalignment	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
M&R activities as required:						
Remove minor corrosion	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Major corrosion, replace member	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Repair or replace members with cracks, chips, holes, or gouges	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Realign & stabilize	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Prepare & paint surfaces	D R	D R	X	X	X	X
	D/P/R	D/P/R				

MISCELLANEOUS METAL, LADDERS, SECURITY GRILLES, CORNER GUARDS, FLAGPOLES, METAL FASCIA & SOFFITS, METAL CANOPIES & SUPPORTS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, holes, dents, & gouges	D/P/R	D R D/P/R	X X	X X	X X	X X
Staining & discoloration	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R	D R D/P/R	X X	X X	X X	X X
Deformed sections	D/P/R R	R	X X	X X	X X	X X
Misalignment; detached sections	D/P/R	D R D/P/R	X X	X X	X X	X X
Loose, broken, or missing sections & fasteners	D/P/R	D R D/P/R	X X	X X	X X	X X
Surface coat damage	D R D/P/R	D R D/P/R	X	X	X	X

=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
Patch small cracks & holes;	D/P/R		X	X	X	X
replace sections with large		D R	X		X	
cracks & holes		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Replace sections with	D/P/R		X	X		
dents or gouges		R			X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Remove corrosion	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Replace deformed sections	D/P/R		X	X		
		R			X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Align & attach sections	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Secure loose sections &	D/P/R		X	X	X	X
fasteners		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Replace broken or missing	D/P/R		X	X	X	X
sections & fasteners		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Clean off surface stains	D/P/R		X	X		
& discoloration		R			X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Prepare & paint surfaces	D R	D R	X		X	
	D/P/R	D/P/R		X		X
=====	=====	=====	=====	=====	=====	=====

IDENTIFYING DEVICES: EXTERIOR SIGNS, LETTERING, & ATTACHMENTS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, chips, holes, dents, & gouges	D/P/R R	R	X X	X X	X X	X X
Loose, broken, or missing sections & fasteners	D/P/R D R D/P/R	R D R D/P/R	X X X	X X X	X X X	X X X
Surface coat damage	D R D/P/R	D R D/P/R	X X	X X	X X	X X
M&R activities as required:						
Secure loose sections & fasteners	D/P/R D R D/P/R	R D R D/P/R	X X X	X X X	X X X	X X X
Repair or replace broken or missing sections & fasteners	D/P/R D R D/P/R	R D R D/P/R	X X X	X X X	X X X	X X X
Prepare & paint surfaces	D R D/P/R	D R D/P/R	X X	X X	X X	X X



=====	=====	=====	=====	=====	=====	=====
GUTTERS & DOWNSPOUTS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	R<45d	R<45d	R>45d	R>45d
=====	=====	=====	=====	=====	=====	=====
Inspect for: .						
=====	=====	=====	=====	=====	=====	=====
Clogged gutter or downspout	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Secured to building	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Water tight	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Corrosion	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Stains & discoloration	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Broken or missing sections & fasteners	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Surface coat damage	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
=====	=====	=====	=====	=====	=====	=====

=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
Remove debris from gutter or downspout	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Secure gutter and downspout to building	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Adjust to make water tight	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Remove corrosion	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace broken or missing sections	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Clean off surface stains & discoloration	D/P/R	R	X	X	X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Prepare surfaces & paint	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

FLASHING & COUNTERFLASHING	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, chips, holes, dents, & gouges	D/P/R	D R	X X	X X	X X	X X
Misaligned sections	D/P/R	D R	X X	X X	X X	X X
Loose, broken, or missing sections & fasteners	D/P/R	D R	X X	X X	X X	X X
M&R activities as required:						
Repair cracks, chips, holes dents, & gouges	D/P/R	D R	X X	X X	X X	X X
Secure loose sections & fasteners	D/P/R	D R	X X	X X	X X	X X
Replace broken or missing sections & fasteners	D/P/R	D R	X X	X X	X X	X X

CAULKING	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Loose caulk	D/P/R	D R D/P/R	X X	X X	X X	X X
Missing caulk	D/P/R	D R D/P/R	X X	X X	X X	X X
Eroded caulk	D/P/R	D R D/P/R	X X	X X	X X	X X
M&R activities as required:						
Remove loose, eroded, or damaged caulk, clean surfaces, recaulk	D/P/R	D R D/P/R	X X	X X	X X	X X

# GENERAL BUILDING TYPES

## EXTERIOR CLOSURE - EXTERIOR WINDOWS AND LOUVERS

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

GLASS & GLAZING	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Broken or missing glass	D/P/R	D R	X X	X X	X X	X X
Broken or missing glazing	D/P/R	D R D/P/R	X X	X X	X X	X X
Double glazing seal failure	R	R	X	X	X	X
M&R activities as required:						
Replace broken or missing glass and glazing, & sealed units	D/P/R	R	X X	X X	X X	X X
If glass or glazing broken or missing, board up opening		D D/P	X	X	X	X
Clean surfaces	R	R	X	X	X	X

=====	=====	=====	=====	=====	=====	=====
STEEL WINDOWS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
Cracks & holes	D/P/R R		X	X	X	X
		R	X	X	X	X
Warping & racking	D/P/R R		X	X	X	X
		R	X	X	X	X
Corrosion	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Stains & discoloration	D/P/R R		X	X		
		R	X	X	X	X
Loose sections & loose or missing fasteners	D/P/R	R	X	X	X	X
Broken or missing sections	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Surface coat damage	D R D R		X		X	
	D/P/R D/P/R			X		X
=====	=====	=====	=====	=====	=====	=====

M&R activities as required:						
Repair cracks & holes	D/P/R R		X	X	X	X
		R	X	X	X	X
Repair damaged surfaces	D/P/R R		X	X	X	X
		R	X	X	X	X
Remove corrosion	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Secure loose sections & loose or missing fasteners	D/P/R	R	X	X	X	X
Replace broken or missing sections	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean off surface stains & discoloration	D/P/R R		X	X	X	X
		R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare surfaces & paint	D R D/P/R	D R D/P/R	X	X	X	X

ALUMINUM WINDOWS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks & holes	D/P/R R	R	X X	X X	X X	X X
Corrosion	R	R	X	X	X	X
Staining & discoloration	D/P/R R	R	X X	X X	X X	X X
Loose sections & loose or missing fasteners	D/P/R	R	X	X	X	X
Broken or missing sections	D/P/R D R D/P/R	R	X X	X X	X X	X X
Surface coat damage	D R D/P/R	D R D/P/R	X	X	X	X



M&R activities as required:						
Repair cracks & holes	D/P/R R		X	X	X X	X X
Repair damaged surfaces	D/P/R R		X	X	X X	X X
Remove corrosion	R	R	X	X	X	X
Secure loose sections & loose or missing fasteners	D/P/R	R	X	X	X	X
Replace broken or missing sections	D/P/R	D R D/P/R	X X	X X	X X	X X
Clean off surface stains & discoloration	D/P/R R		X	X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare surfaces & paint (for previously painted surfaces only)	D R D/P/R	D R D/P/R	X	X	X	X

VINYL CLAD WOOD WINDOWS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, chips, & holes	D/P/R R	R	X X	X X	X X	X X
Open joints	D/P/R D R D/P/R	R X	X X	X X	X X	X X
Surface damage; detachment	D/P/R R	R	X X	X X	X X	X X
Decayed wood core	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration	D/P/R R	R	X X	X X	X X	X X
Loose sections & loose or missing fasteners	D/P/R	R	X	X	X	X
Broken or missing sections	D/P/R D R D/P/R	R X	X X	X X	X X	X X

M&R activities as required:						
Patch cracks, chips, & holes	D/P/R		X	X	X	X
	R		X	X	X	X
Replace decayed sections	D/P/R		X	X	X	X
	R		X	X	X	X
Secure loose sections & loose or missing fasteners	D/P/R	R	X	X	X	X
Replace broken or missing sections	D/P/R	D R	X	X	X	X
	D/P/R		X	X	X	X
Seal open joints	D/P/R	D R	X	X	X	X
	D/P/R		X	X	X	X
Clean off surface stains & discoloration	D/P/R		X	X	X	X
	R		X	X	X	X
Clean surfaces	R	R	X	X	X	X

METAL CLAD WOOD WINDOWS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, chips, holes, dents, & gouges	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R	D R D/P/R	X X	X X	X X	X X
Open joints	D/P/R	D R D/P/R	X X	X X	X X	X X
Decayed wood core	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration	D/P/R R	R	X X	X X	X X	X X
Loose sections & loose or missing fasteners	D/P/R	R	X	X	X	X
Broken or missing sections	D/P/R	D R D/P/R	X X	X X	X X	X X
Surface damage; detachment	D R D R D/P/R D/P/R		X	X	X	X

M&R activities as required:						
Patch cracks, chips, holes, dents, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Replace decayed sections	D/P/R R		X	X	X	X
		R	X	X	X	X
Secure loose sections & loose or missing fasteners	D/P/R	R	X	X	X	X
Replace broken or missing sections	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Seal open joints	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean off surface stains & discoloration	D/P/R R		X	X	X	X
		R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare surfaces & paint (for previously painted surfaces only)	D R D/P/R	D R D/P/R	X	X	X	X

WOOD WINDOWS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, splits, & holes	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Warp	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Staining & discoloration	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Rot	D/P/R		X	X	X	X
	D	R	X		X	
	D/P/R			X		X
Insect infestation	D/P/R		X	X	X	X
	D	R	X		X	
	D/P/R			X		X
Fungal growth	D/P/R		X	X	X	X
	D	R	X		X	
	D/P/R			X		X
Loose sections & loose or missing fasteners	D/P/R	R	X	X	X	X
Broken or missing sections	D/P/R		X	X	X	X
	D	R	X		X	
	D/P/R			X		X
Open joints	D/P/R		X	X	X	X
	D	R	X		X	
	D/P/R			X		X
Surface coat damage	D	R	X		X	
	D/P/R	D		X		X

M&R activities as required:						
Repair cracks, splits, & holes	D/P/R R		X X	X X	X X	X X
Refinish surfaces	D/P/R R		X X	X X	X X	X X
Remove rot & replace sections	D/P/R	D R D/P/R	X X	X X	X X	X X
Secure loose sections & loose or missing fasteners	D/P/R	R	X	X	X	X
Replace broken or missing sections	D/P/R	D R D/P/R	X X	X X	X X	X X
Tighten open joints	D/P/R	D R D/P/R	X X	X X	X X	X X
Eradicate insect infestation	D/P/R	D R D/P/R	X X	X X	X X	X X
Clean off fungus growth	D/P/R	D R D/P/R	X X	X X	X X	X X
Clean off surface stains & discoloration	D/P/R R	R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare surfaces & paint	D R D/P/R	D R	X	X	X	X

WINDOW HARDWARE	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Broken or missing components (stays, handles, balances, etc.)	D/P/R R	R	X X	X X	X X	X X
Window locks	D/P/R D R D/P/R	R	X X	X X	X X	X X
Corrosion	D/P/R R	R	X X	X X	X X	X X
Malfunction or misalignment	D/P/R R	R	X X	X X	X X	X X
Operation of balances	D/P/R R	R	X X	X X	X X	X X
M&R activities as required:						
Repair or replace broken or missing components	D/P/R R	R	X X	X X	X X	X X
Repair or replace window locks	D/P/R D R D/P/R	R	X X	X X	X X	X X
Restore to proper working order, eg., unsticking a wood window	D/P/R R	R	X X	X X	X X	X X
Remove corrosion	D/P/R R	R	X X	X X	X X	X X
Refinish hardware	D/P/R R	R	X X	X X	X X	X X



METAL LOUVERS & METAL GRILLES	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, holes, dents, & gouges	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R D R D/P/R	R R	X X	X X	X X	X X
Secure screening	D/P/R D R D/P/R	R R	X X	X X	X X	X X
Loose sections & loose or missing fasteners	D/P/R	R	X	X	X	X
Broken or missing sections	D/P/R D R D/P/R	R R	X X	X X	X X	X X
Surface coat damage	D R D/E/R	D R D/P/R	X	X	X	X

M&R activities as required:						
Repair cracks, holes, dents, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Remove corrosion	D/P/R		X	X	X	X
	D	R	X		X	
	D/P/R			X		X
Reattach and seal screening	D/P/R		X	X	X	X
	D	R	X		X	
	D/P/R			X		X
Secure loose sections & loose or missing fasteners	D/P/R	R	X	X	X	X
Replace broken or missing sections	D/P/R		X	X	X	X
	D	R	X		X	
	D/P/R			X		X
Clean surfaces; clean screens to keep clear air flow	R	R	X	X	X	X
Prepare surfaces & paint	D	R	D	R	X	X
	D/P/R	D/P/R		X		X

WINDOW SCREENS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Loose screens		D D/P	X	X	X	X
Damaged screens	R	R	X	X	X	X
Corrosion	R	R	X	X	X	X
Surface coat damage	R	R	X	X	X	X
M&R activities as required:						
Remove screens, store in building	D		X	X	X	X
Remove loose screens, store in building		D D/P	X	X	X	X
Repair or replace damaged screens	R	R	X	X	X	X
Remove corrosion	R	R	X	X	X	X
Refinish surfaces	R	R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare surfaces & paint	R	R	X	X	X	X

CAULKING	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Loose caulk	D/P/R	D R	X X	X X	X X	X X
Missing caulk	D/P/R	D R	X X	X X	X X	X X
Eroded caulk	D/P/R	D R	X X	X X	X X	X X
M&R activities as required:						
Remove loose, eroded, or damaged caulk, clean surfaces, recaulk	D/P/R	D R	X X	X X	X X	X X

# GENERAL BUILDING TYPES

## EXTERIOR CLOSURE - EXTERIOR DOORS

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimum  
R = Reactivation yr = year  
d = days

HOLLOW METAL DOORS & FRAMES & STEEL DOORS & FRAMES	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks & holes	D/P/R	D R	X	X	X	X
		D/P/R		X	X	X
Surface abrasion, dents, gouges, & chips	D/P/R	R	X	X	X	X
		R	X	X	X	X
Malfunction or misalignment	D/P/R	R	X	X	X	X
		R	X	X	X	X
Corrosion	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Stains & discoloration	D/P/R	R	X	X	X	X
		R	X	X	X	X
Loose, broken, or missing sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Surface coat damage	D R	D R	X	X	X	X
	D/P/R	D/P/R		X		X

M&R activities as required:						
Repair cracks & holes dents, & gouges	D/P/R	D R	X X	X X	X X	X X
Repair damaged surfaces	D/P/R R	R	X X	X X	X X	X X
Repair or replace doors & frames	D/P/R	R	X	X	X	X
Remove corrosion	D/P/R	D R D/P/R	X X	X X	X X	X X
Secure loose sections & fasteners	D/P/R	D R D/P/R	X X	X X	X X	X X
Replace broken or missing sections & fasteners	D/P/R	D R D/P/R	X X	X X	X X	X X
Clean off surface stains & discoloration	D/P/R R	R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D/P/R	D R D/P/R	X	X	X	X

METAL COILING DOORS & MTL SECTIONAL OVERHEAD DRS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks & holes	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Surface abrasion, dents, gouges, & chips	D/P/R		X	X		
		R	X	X	X	X
Malfunction or misalignment	D/P/R		X	X		
		R	X	X	X	X
Corrosion	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Stains & discoloration	D/P/R		X	X		
		R	X	X	X	X
Loose, broken, or missing sections & fasteners	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Surface coat damage	D R	D R	X		X	
	D/P/R	D/P/R		X		X

M&R activities as required:						
Repair cracks & holes dents, & gouges	D/P/R	D R D/P/R	X X	X X	X X	X X
Repair damaged surfaces	D/P/R R	R	X X	X X	X X	X X
Repair or replace doors & frames & operating mechanism	D/P/R	R	X X	X X	X X	X X
Remove corrosion	D/P/R	D R D/P/R	X X	X X	X X	X X
Secure loose sections & fasteners	D/P/R	D R D/P/R	X X	X X	X X	X X
Replace broken or missing sections & fasteners	D/P/R	D R D/P/R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D/P/R	D R D/P/R	X	X	X	X



SECTIONAL OVERHEAD DOORS: WOOD PANELS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, splits, & holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Surface abrasion, gouges, & chips	D/P/R	R	X	X	X	X
	R		X	X	X	X
Malfunction or misalignment	D/P/R	R	X	X	X	X
	R		X	X	X	X
Warp	D/P/R	R	X	X	X	X
	R		X	X	X	X
Rot	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Staining & discoloration	D/P/R	R	X	X	X	X
	R		X	X	X	X
Insect infestation	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Loose, broken, or missing sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Surface coat damage	D R	D R	X	X	X	X
	D/P/R	D R	X	X	X	X

M&R activities as required:						
Patch cracks, splits, & holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Repair damaged surfaces	D/P/R	R	X	X	X	X
		R	X	X	X	X
Repair or replace doors, panels, or frames	D/P/R	R	X	X	X	X
		R	X	X	X	X
Remove & replace rotted doors, panels, or frames	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Eradicate insect infestation	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Secure loose sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace broken or missing sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean off surface stains & discoloration	D/P/R	R	X	X	X	X
		R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R	D R	X	X	X	X
	D/P/R	D R	X	X	X	X

WOOD DOORS & FRAMES	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, splits, & holes	D/P/R	D R D/P/R	X X	X X	X X	X X
Surface abrasion, gouges, & chips	D/P/R R	R	X X	X X	X X	X X
Malfunction or misalignment	D/P/R R	R	X X	X X	X X	X X
Warp	D/P/R R	R	X X	X X	X X	X X
Rot	D/P/R	D R D/P/R	X X	X X	X X	X X
Staining & discoloration	D/P/R R	R	X X	X X	X X	X X
Insect infestation	D/P/R	D R D/P/R	X X	X X	X X	X X
Loose, broken, or missing sections & fasteners	D/P/R	D R D/P/R	X X	X X	X X	X X
Surface coat damage	D R D/P/R	D R	X	X	X	X

M&R activities as required:						
Patch cracks, splits, & holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Repair damaged surfaces	D/P/R		X	X		
	R	R	X	X	X	X
Repair or replace doors, panels, or frames	D/P/R	R	X	X	X	X
Remove & replace rotted doors, panels, or frames	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Eradicate insect infestation	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Secure loose sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace broken or missing sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean off surface stains & discoloration	D/P/R		X	X		
	R	R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R	D R	X	X	X	X
	D/P/R	D R	X	X	X	X

=====	=====	=====	=====	=====	=====	=====
STEEL & GLASS DOORS & FRAMES	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	=====	=====	=====	=====
Inspect for:			R<45d	R<45d	R>45d	R>45d
=====	=====	=====	=====	=====	=====	=====
Cracks & holes	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Surface abrasion; scratches	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Malfunction or misalignment	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Corrosion	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Stains & discoloration	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Loose, broken, or missing sections & fasteners	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Cracked, broken, or missing glass	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Surface coat damage	D R	D R	X		X	
	D/P/R	D/P/R		X		X
=====	=====	=====	=====	=====	=====	=====

=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
Repair cracks & holes	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Repair damaged surfaces	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Repair or replace doors & frames	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Remove corrosion	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Secure loose sections & fasteners	R	R	X	X	X	X
Replace broken or missing sections & fasteners	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Replace broken or missing glass	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
If broken, remove glass & board up opening; if missing, board up opening	D/P		X		X	X
		D			X	
		D/P		X		X
Clean off surface stains & discoloration	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R	D R	X		X	
	D/P/R	D/P/R		X		X
=====	=====	=====	=====	=====	=====	=====

ALUMINUM & GLASS DOORS & FRAMES	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks & holes	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Surface abrasion; scratches	D/P/R		X	X		
		R			X	X
		R	X	X	X	X
Malfunction or misalignment	D/P/R		X	X		
		R			X	X
		R	X	X	X	X
Corrosion	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Stains & discoloration	D/P/R		X	X		
		R			X	X
		R	X	X	X	X
Loose, broken, or missing sections & fasteners	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Cracked, broken, or missing glass	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Surface coat damage	D R	D R	X		X	
	D/P/R	D/P/R		X		X

M&R activities as required:						
Repair cracks & holes	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Repair damaged surfaces	D/P/R	R	X	X	X	X
		R	X	X	X	X
Repair or replace doors & frames	D/P/R	R	X	X	X	X
		R	X	X	X	X
Remove corrosion	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Secure loose sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace broken or missing sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace broken or missing glass	D/P/R	R	X	X	X	X
		R	X	X	X	X
If broken, remove glass & board up opening; if missing, board up opening	D/P	D	X	X	X	X
		D/P	X	X	X	X
Clean off surface stains & discoloration	D/P/R	R	X	X	X	X
		R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces (for previously painted surfaces only)	D R	D R	X	X	X	X
	D/P/R	D/P/R	X	X	X	X



=====	=====	=====	=====	=====	=====	=====
SCREEN DOORS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	R<45d	R<45d	R>45d	R>45d
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
Damaged doors	R	R	X	X	X	X
Corrosion	R	R	X	X	X	X
Surface coat damage	R	R	X	X	X	X
M&R activities as required:						
Remove screen doors, store in building	D	D	X	X	X	X
Repair or replace damaged screen doors	R	R	X	X	X	X
Remove corrosion	R	R	X	X	X	X
Refinish surfaces	R	R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	R	R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

GLASS IN DOORS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracked, broken, or missing glass	D/P/R	D R D/P/R	X X	X X	X X	X X
Broken or missing seals or gaskets	D/P/R	D R D/P/R	X X	X X	X X	X X
M&R activities as required:						
Replace cracked, broken, or missing glass	D/P/R R	R	X X	X X	X X	X X
If broken, remove glass & board up opening; if missing, board up opening	D/P	D D/P	X	X	X X	X X
Replace broken or missing seals or gaskets	D/P/R R	R	X X	X X	X X	X X
If seals or gaskets broken or missing, board up opening	D/P	D D/P	X	X	X X	X X
Clean surfaces	R	R	X	X	X	X

=====	=====	=====	=====	=====	=====	=====
LOUVERS IN DOORS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	R<45d	R<45d	R>45d	R>45d
Inspect for:	=====	=====	=====	=====	=====	=====
Cracks, holes, dents, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Corrosion	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Secure screening	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Loose, broken, or missing sections & fasteners	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Surface coat damage	D R	D R	X	X	X	X
	D/P/R	D/P/R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

M&R activities as required:						
Repair crack, holes, dents, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Remove corrosion	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Reattach and seal screening	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Secure loose sections & fasteners	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Replace broken or missing sections & fasteners	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Clean surfaces; clean screens to keep clear air flow	R	R	X	X	X	X
Prepare & paint surfaces	D R D/P/R	D R D/P/R	X	X	X	X

DOOR HARDWARE	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Functioning hinges	D/P/R	D R	X X	X X	X X	X X
Functioning door locks	D/P/R	D R	X X	X X	X X	X X
Broken or missing components	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R	D R	X X	X X	X X	X X
Malfunction or misalignment	D/P/R	D R	X X	X X	X X	X X
M&R activities as required:						
Oil hinges	D/P/R	D R	X X	X X	X X	X X
Repair or replace door locks	D/P/R	D R	X X	X X	X X	X X
Repair or replace components	D/P/R R	R	X X	X X	X X	X X
Remove corrosion	D/P/R	D R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces (previously painted surfaces only)	D R D/P/R	D R D/P/R	X X	X X	X X	X X

CAULKING	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Loose caulk	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Broken or missing caulk	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Eroded caulk	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
M&R activities as required:						
Remove loose, broken, or eroded caulk	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Clean surfaces & recaulk	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X

## **APPENDIX D:**

### **INSPECTION AND M&R CHECKLISTS FOR INTERIOR CONSTRUCTION**

#### **General Notes on Structure**

##### *Structural Components*

Failures occurring during the normal life expectancy of buildings and structures should be carefully investigated, and the fundamental defects corrected prior to superficial repair.

If the cause of the failure is not immediately discernible, or if the corrective measures are not straightforward or standard, consultation and advice should be obtained from qualified architects or structural engineers. Most of the defects listed for the structural components could result from a number of mechanisms; the cause and extent of deterioration may simply be unknown.

The architect or engineer should determine the cause of the deterioration and the strength of the existing structure and then provide recommendations on how to proceed. These recommendations may include:

1. To permit deterioration to continue
2. To take measures to preserve the structure in its present condition without any attempt to strengthen it
3. To strengthen the construction
4. To reconstruct or abandon the construction, if deterioration is exceptionally severe.

The decision should be rendered on the basis of safety, economics, and appearance.

##### *Cracks*

Before any attempt is made to repair a crack, an investigation should be undertaken to determine the cause of the crack. The following precautions should be observed:

1. Do not attempt to repair cracks as soon as they appear. Observe the cracks periodically over time to determine whether the crack is active or passive. Determine the cause of the crack and correct it.
2. Do not attempt to repair a fine crack by chiseling out a deep groove and repointing. Repair fine cracks by filling or bridging over with a cement-based wash or paint.
3. Do not caulk cracks above grade with light plastic or dark bituminous caulking compounds that will contrast with the wall finish. If such materials must be used, seal the caulking by coating with a shellac or aluminum paint, then paint to match the surrounding area.

### *Holes*

Take immediate corrective measures if holes are of a size or depth that may cause substrate deterioration or permit water penetration.

### *Concrete Masonry Walls*

For bowing, bulging, and out-of-plumb concrete masonry walls and retaining walls, note that general deviations from the vertical and horizontal in excess of 1/240 of the unsupported length, or 0.5 in. per 10 ft,\* are likely to be noticed and should be investigated by a qualified architect or structural engineer.

### **General Notes on Painting**

When corrosion is removed from a surface, that surface must receive touch-up paint.

Existing paint coatings may contain lead, which is a hazardous material. Special precautions must be taken when working with or around such coatings.

If pitting corrosion is present, remove corrosion, spot prime and topcoat entire surface. If pitting corrosion continues, determine cause of corrosion and fix the condition before performing any further M&R.

### *Interior Metal*

#### **Preferred Maintenance:**

Perform surface preparation of general corrosion covering 3 percent or more and pitted corrosion covering 0.1 percent or greater of the surface.

#### **Minimal Maintenance:**

Perform surface preparation of deteriorated coatings covering 5 percent or more and pitted corrosion covering 0.25 percent or more of the surface.

### *Interior Concrete*

#### **Preferred Maintenance:**

Perform surface preparation of deteriorated coatings covering 3 percent or more of the surface.

#### **Minimal Maintenance:**

Where noted, perform surface preparation of deteriorated coatings covering 10 percent or more of the surface.

### *Interior Wood*

#### **Preferred Maintenance:**

Where noted, perform surface preparation of deteriorated coatings covering 3 percent or more of the surface.

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\*U.S. standard units of measure are used in this report. A metric conversion table can be found on page 8.



**Minimal Maintenance:**

Where noted, perform surface preparation of deteriorated coatings covering 7 percent or more of the surface.

***Interior Concrete Masonry Unit***

**Preferred Maintenance:**

Perform surface preparation of deteriorated coatings covering 3 percent or more of the surface.

**Minimal Maintenance:**

Perform surface preparation of deteriorated coating covering 10 percent or more of the surface.

**Checklist Contents**

The interior construction component consists of the architectural and structural elements contained within the building envelope. Its subcomponents are Walls, Floors and Bases, Ceilings, Doors, Specialties, and Exposed Structural Elements. This component does not include furniture, furnishings, or equipment.

***Walls***

- Concrete Masonry Units
- Structural Glazed Tile & Brick Masonry Units
- Gypsum Wallboard
- Gypsum Plaster
- Ceramic Tile
- Concrete Walls
- Wood Paneling & Wood Surfaces
- Wood Veneer Faced Paneling & Plastic Laminate Paneling
- Vinyl, Fabric, Wallpaper
- Metal Cladding & Metal Panels

***Floors & Bases***

- Concrete Floors
- Resilient Tile & Resilient Flooring
- Terrazzo Flooring
- Wood Flooring
- Ceramic Tile
- Carpet
- Bases: Vinyl, Metal, Wood, Structural Glazed Tile, & Ceramic Tile

### *Ceilings*

- Concrete Ceilings
- Suspended Metal Ceilings
- Gypsum Board Ceilings & Plaster Ceilings
- Acoustical Ceilings
- Exposed Ceiling Insulation

### *Doors*

- Hollow Metal Doors & Frames; Steel Doors & Frames
- Metal & Glass Doors & Frames
- Wood Doors & Frames
- Glass in Doors
- Louvers in Doors
- Door Hardware
- Caulking

### *Specialties*

- Metal Toilet Partitions
- Toilet & Bath Accessories
- Metal Wall Louvers
- Metal Grilles & Screens
- Identifying Devices: Bulletin Boards, Interior Signs, Directories, Etc.
- Metal Lockers
- Fire Protection Cabinets
- Storage Shelving
- Closet Specialties
- Casework
- Wood Bleachers
- Venetian Blinds

### *Exposed Structural Elements*

- Trusses
- Roof Rafters & Purlins
- Joists, Beams, & Girders
- Columns

# GENERAL BUILDING TYPES

## INTERIOR CONSTRUCTION - WALLS

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

CONCRETE MASONRY UNITS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, holes, & gouges	D/P/R		X	X	X	X
	R	R	X	X	X	X
Surface marring	D/P/R		X	X	X	X
	R	R	X	X	X	X
Staining & discoloration & mildew	D/P/R	R	X	X	X	X
Loose, broken, or missing units	D/P/R		X	X	X	X
	R	R	X	X	X	X
Cracked, broken, loose, or crumbling, or missing mortar	D/P/R		X	X	X	X
	R	R	X	X	X	X
Surface coat damage	D R D		X		X	
	D/P/R D R			X		X
Locate source of moisture penetration	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X

M&R activities as required:						
Patch cracks, holes, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Repair damaged surfaces	D/P/R R		X	X	X	X
		R	X	X	X	X
Resecure loose units; replace broken or missing units	D/P/R R		X	X	X	X
		R	X	X	X	X
Remove cracked, broken, loose, or crumbling mortar; tuckpoint joints	D/P/R R		X	X	X	X
		R	X	X	X	X
Clean off surface stains & discoloration & mildew	D/P/R	R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D D/P/R	D D	X	X	X	X
		R		X		X

STRUCTURAL GLAZED TILE & BRICK MASONRY UNITS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks & holes	D/P/R R		X	X	X	X
		R	X	X	X	X
Surface marring	D/P/R R		X	X	X	X
		R	X	X	X	X
Staining & discoloration & mildew	D/P/R	R	X	X	X	X
Loose, broken, or missing units	D/P/R R		X	X	X	X
		R	X	X	X	X
Cracked, broken, loose, or crumbling, or missing mortar	D/P/R R		X	X	X	X
		R	X	X	X	X
Locate source of moisture penetration	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X

=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
Patch cracks & holes	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Repair damaged surfaces	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Resecure loose units; replace broken or missing units	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Remove cracked, broken, loose, or crumbling mortar; tuckpoint joints	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Clean off surface stains & discoloration & mildew	D/P/R		X	X	X	X
		R				
-----	-----	-----	-----	-----	-----	-----
Clean surfaces (including stains & discoloration)		R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

GYPSUM WALLBOARD	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, holes, & gouges	D/P/R		X	X	X	X
	R	R	X	X	X	X
Surface marring	D/P/R		X	X	X	X
	R	R	X	X	X	X
Fasteners, protrusions, & joint failure	D/P/R		X	X	X	X
	R	R	X	X	X	X
Staining & discoloration & mildew	D/P/R	R	X	X	X	X
Moisture damage (including sugaring)	D/P/R	R	X	X	X	X
Surface coat damage	D R D		X		X	
	D/P/R D R			X		X
Locate source of moisture penetration	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X

=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
Patch cracks, holes, gouges, & joints	D/P/R R		X	X	X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Resecure fasteners	D/P/R R		X	X	X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Retape joints	D/P/R R		X	X	X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Repair moisture damage	D/P/R	R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Clean off surface stains & discoloration & mildew	D/P/R	R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Clean surfaces	R	R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Prepare & paint surfaces	D R D		X		X	
	D/P/R D R			X		X
=====	=====	=====	=====	=====	=====	=====



GYPSUM PLASTER	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, holes, chips, & gouges	D/P/R		X	X	X	X
	R	R	X	X	X	X
Surface marring	D/P/R		X	X	X	X
	R	R	X	X	X	X
Staining & discoloration & mildew	D/P/R	R	X	X	X	X
Moisture damage	D/P/R	R	X	X	X	X
Surface coat damage	D R D		X		X	
	D/P/R D R			X		X
Locate source of moisture penetration	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X

M&R activities as required:						
Patch cracks, holes, chips, & gouges	D/P/R R	R	X	X	X	X
Repair moisture damage	D/P/R	R	X	X	X	X
Clean off surface stains & discoloration & mildew	D/P/R	R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D D/P/R D R		X	X	X	X

CERAMIC TILE	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, chips, & holes	D/P/R		X	X	X	X
	R	R	X	X	X	X
Surface marring	D/P/R		X	X	X	X
	R	R	X	X	X	X
Stains & discoloration & mildew	D/P/R	R	X	X	X	X
Loose tiles	D/P/R		X	X	X	X
	R	R	X	X	X	X
Broken or missing tiles	D/P/R		X	X	X	X
	R	R	X	X	X	X
Loose or missing grout	D/P/R		X	X	X	X
	R	R	X	X	X	X
Moisture damage	D/P/R		X	X	X	X
	R	R	X	X	X	X
Locate source of moisture penetration	D/F/R	D R	X	X	X	X
	D/P/R		X	X	X	X

M&R activities as required:						
Patch cracks, chips, & holes	D/P/R R		X	X	X	X
		R	X	X	X	X
Repair damaged surfaces	D/P/R R		X	X	X	X
		R	X	X	X	X
Grout-in loose tiles	D/P/R R		X	X	X	X
		R	X	X	X	X
Replace broken or missing tiles	D/P/R R		X	X	X	X
		R	X	X	X	X
Remove loose grout; regrout joints	D/P/R R		X	X	X	X
		R	X	X	X	X
Repair moisture damage	D/P/R R		X	X	X	X
		R	X	X	X	X
Clean off surface stains & discoloration & mildew	D/P/R	R	X	X	X	X
Clean surfaces	R	R	X	X	X	X

CONCRETE WALLS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks & holes	D/P/R R	R	X X	X X	X X	X X
Chips & gouges	D/P/R R	R	X X	X X	X X	X X
Surface marring	D/P/R R	R	X X	X X	X X	X X
Spalling & scaling	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration & mildew	D/P/R	R	X	X	X	X
Exposed reinforcing	D/P/R	D R D/P/R	X X	X X	X X	X X
Damaged expansion joints	D/P/R	D R D/P/R	X X	X X	X X	X X
Surface coat damage	D R D/P/R	D R	X	X	X	X
Locate source of moisture penetration	D/P/R	D R D/P/R	X X	X X	X X	X X

M&R activities as required:						
Repair cracks & holes	D/P/R R	R	X X	X X	X X	X X
Patch chips & gouges	D/P/R R	R	X X	X X	X X	X X
Repair spalled or scaled area	D/P/R R	R	X X	X X	X X	X X
Clean rebar & adjacent concrete; coat rebar, patch area	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Replace rebar; clean adjacent concrete, patch area	D/P/R R	R	X X	X X	X X	X X
Repair expansion joints	D/P/R R	R	X X	X X	X X	X X
Clean off surface stains & discoloration & mildew	D/P/R	R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D/P/R	D R D R	X	X	X	X

WOOD PANELING & WOOD SURFACES	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, chips, holes, & gouges	D/P/R R	R	X X	X X	X X	X X
Surface marring & abrasion	D/P/R R	R	X X	X X	X X	X X
Warp; loose sections	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration & mildew	D/P/R	R	X	X	X	X
Rot	D/P/R D R D/P/R		X X	X X	X X	X X
Insect infestation	D/P/R D R D/P/R		X X	X X	X X	X X
Surface coat damage	D R D/P/R	D R	X	X	X	X
Locate source of moisture penetration	D/P/R D R D/P/R		X X	X X	X X	X X

M&R activities as required:						
Patch cracks, chips, holes, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Repair damaged surfaces	D/P/R R		X	X	X	X
		R	X	X	X	X
Refinish damaged surfaces	D/P/R R		X	X	X	X
		R	X	X	X	X
Secure loose panels	D/P/R R		X	X	X	X
		R	X	X	X	X
Replace panels	D/P/R R		X	X	X	X
		R	X	X	X	X
Replace rotted panels	D/P/R	D R D/P/R	X X	X X	X X	X X
Eradicate insect infestation	D/P/R	D R D/P/R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D D/P/R	D R D R	X	X	X	X



WOOD VENEER FACED PANELING & PLASTIC LAMINATE PANELING	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, chips, holes, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Surface marring & abrasion	D/P/R R		X	X	X	X
		R	X	X	X	X
Warp; loose sections	D/P/R R		X	X	X	X
		R	X	X	X	X
Staining & discoloration & mildew	D/P/R	R	X	X	X	X
Rot	D/P/R		X	X	X	X
		D R	X	X	X	X
		D/P/R		X		X
Delamination	D/P/R R		X	X	X	X
		R	X	X	X	X
Insect infestation	D/P/R		X	X	X	X
		D R	X	X	X	X
		D/P/R		X		X
Locate source of moisture penetration	D/P/R		X	X	X	X
		D R	X	X	X	X
		D/P/R		X		X

M&R activities as required:						
Patch cracks, chips, holes, & gouges	D/P/R		X	X	X	X
	R	R	X	X	X	X
Repair damaged surfaces	D/P/R		X	X	X	X
	R	R	X	X	X	X
Refinish damaged surfaces	D/P/R		X	X	X	X
	R	R	X	X	X	X
Secure loose panels	D/P/R		X	X	X	X
	R	R	X	X	X	X
Replace panels	D/P/R		X	X	X	X
	R	R	X	X	X	X
Replace rotted panels	D/P/R	D R	X	X	X	X
	D/P/R	D/P/R	X	X	X	X
Eradicate insect infestation	D/P/R	D R	X	X	X	X
	D/P/R	D/P/R	X	X	X	X
Clean off surface stains & discoloration & mildew	D/P/R	R	X	X	X	X
Clean surfaces	R	R	X	X	X	X

VINYL, FABRIC, WALLPAPER	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Holes, gouges, splits, tears, peeling, & blistering	D/P/R R	R	X X	X X	X X	X X
Surface abrasion and marring	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration	R	R	X	X	X	X
Insect infestation	D/P/R D R D/P/R		X X	X X	X X	X X
Moisture damage	D/P/R R	R	X X	X X	X X	X X
Locate source of moisture penetration	D/P/R D R D/P/R		X X	X X	X X	X X

M&R activities as required:						
Patch holes, gouges, splits, & tears	D/P/R R	R	X	X	X	X
Resecure peeling or blistering paper	D/P/R R	R	X	X	X	X
Repair damaged surfaces	D/P/R R	R	X	X	X	X
Replace sections	D/P/R R	R	X	X	X	X
Eradicate insect infestation	D/P/R D R D/P/R	R	X	X	X	X
Repair moisture damage	D/P/R R	R	X	X	X	X
Clean surfaces	R	R	X	X	X	X

METAL CLADDING & METAL PANELS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, holes, dents, & gouges	D/P/R R	R	X X	X X	X X	X X
Surface marring	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration	R	R	X	X	X	X
Corrosion	D/P/R	D R D/P/R	X X	X X	X X	X X
Deformed sections	D/P/R R	R	X X	X X	X X	X X
Loose, broken, or missing sections or fasteners	D/P/R R	R	X X	X X	X X	X X
Surface coat damage	D R D/P/R	D R D/P/R	X	X	X	X
Locate source of moisture penetration	D/P/R	D R D/P/R	X X	X X	X X	X X

=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
Patch small cracks & holes;	D/P/R		X	X		
replace sections with large	R				X	X
cracks & holes		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace sections with	D/P/R		X	X		
dents or gouges	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Remove corrosion	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Replace deformed sections	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Secure loose sections &	D/P/R		X	X		
fasteners	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace broken or missing	D/P/R		X	X		
sections & fasteners	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Clean surfaces	R	R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Prepare & paint surfaces	D R	D R	X		X	
	D/P/R	D/P/R		X		X
=====	=====	=====	=====	=====	=====	=====

# GENERAL BUILDING TYPES

## INTERIOR CONSTRUCTION - FLOORS & BASES

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

CONCRETE FLOORS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks & holes	D/P/R R	R	X	X	X	X
Surface abrasion, wear, & gouges	D R	R	X	X	X	X
Spalling & scaling	D/P/R R	R	X	X	X	X
Stains & discoloration	R	R	X	X	X	X
Surface coat damage	D R D/P/R	D R	X	X	X	X
Locate source of moisture penetration	D/P/R	D R D/P/R	X X	X X	X X	X X

M&R activities as required:						
Patch cracks & holes	D/P/R		X	X	X	X
	R	R	X	X	X	X
Repair gouges; resurface or patch eroded surfaces	D		X	X	X	X
	R	R	X	X	X	X
Remove spalling & scaling, patch area	D/P/R		X	X	X	X
	R	R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces (when previously painted)	D R	D	X	X	X	X
	D/P/R	D R		X		



RESILIENT TILE & RESILIENT FLOORING	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, chips, & holes	D/P/R R	R	X	X	X	X
Surface abrasion, wear, & gouges	D/P/R R	R	X	X	X	X
Stains & discoloration	R	R	X	X	X	X
Loose or missing tiles	D/P/R R	R	X	X	X	X
Open joints	D/P/R R	R	X	X	X	X
Locate source of moisture penetration	D/P/R D R D/P/R		X X	X X	X X	X X

M&R activities as required:						
Replace damaged tiles	D/P/R R		X	X	X	X
		R	X	X	X	X
Replace missing tiles	D/P/R R		X	X	X	X
		R	X	X	X	X
Readhere loose tiles	D/P/R R		X	X	X	X
		R	X	X	X	X
Clean surfaces	R	R	X	X	X	X

TERRAZZO FLOORING	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, chips, & holes	D/P/R R		X	X	X	X
		R	X	X	X	X
Surface abrasion, wear, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Staining & discoloration	R	R	X	X	X	X
Open joints at divider strips	D/P/R R		X	X	X	X
		R	X	X	X	X
Broken or missing divider strips	D/P/R R		X	X	X	X
		R	X	X	X	X
Locate source of moisture penetration	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
M&R activities as required:						
Repair or replace damaged areas	D/P/R R		X	X	X	X
		R	X	X	X	X
Replace broken or missing divider strips	D/P/R R		X	X	X	X
		R	X	X	X	X
Clean surfaces	R	R	X	X	X	X

WOOD FLOORING	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, splits, & holes	D/P/R R	R	X X	X X	X X	X X
Sags & warp	D/P/R R	R	X X	X X	X X	X X
Surface abrasion, wear, & gouges	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration	R	R	X	X	X	X
Rot	D/P/R	D R D/P/R	X X	X X	X X	X X
Loose or open joints	D/P/R	D R D/P/R	X X	X X	X X	X X
Loose, broken, or missing sections	D/P/R	D R D/P/R	X X	X X	X X	X X
Insect infestation	D/P/R	D R D/P/R	X X	X X	X X	X X
Fungal growth	D/P/R	D R D/P/R	X X	X X	X X	X X
Locate source of moisture penetration	D/P/R	D R D/P/R	X X	X X	X X	X X

M&R activities as required:						
Repair or replace damaged areas	D/P/R		X	X	X	X
	R	R	X	X	X	X
Replace broken, missing, or rotted sections	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Readhere loose sections	D/P/R		X	X	X	X
	R	R	X	X	X	X
Eradicate insect infestation	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Refinish surfaces	D/P/R		X	X	X	X
	R	R	X	X	X	X

CERAMIC TILE	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, chips, & holes	D/P/R R	R	X X	X X	X X	X X
Surface abrasion, wear, & gouges	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration	R	R	X	X	X	X
Loose tile	D/P/R R	R	X X	X X	X X	X X
Broken or missing tile	D/P/R R	R	X X	X X	X X	X X
Loose, broken or missing grout	D/P/R R	R	X X	X X	X X	X X
Locate source of moisture penetration	D/P/R	D R D/P/R	X X	X X	X X	X X

=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
Repair or replace damaged areas	D/P/R R		X	X	X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
RegROUT loose tile	D/P/R R		X	X	X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace broken or missing tile	D/P/R R		X	X	X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace loose, broken or missing grout	D/P/R R		X	X	X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Clean surfaces	R	R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

CARPET	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Rips, tears, holes, wear, & raveling	D/P/R R	R	X	X	X	X
Wrinkles	D/P/R R	R	X	X	X	X
Staining & discoloration	D/P/R R	R	X	X	X	X
Dampness; rot	D/P/R D R D/P/R		X X	X X	X X	X X
Insect infestation	D/P/R D R D/P/R		X X	X X	X X	X X
Locate source of moisture penetration	D/P/R D R D/P/R		X X	X X	X X	X X
M&R activities as required						
Repair or replace damaged sections	D/P/R R	R	X	X	X	X
Restretch	D/P/R R	R	X	X	X	X
Remove damp, rotten sections & replace	D/P/R D R D/P/R		X X	X X	X X	X X
Eradicate insect infestation	D/P/R D R D/P/R		X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X



=====	=====	=====	=====	=====	=====	=====
BASES: VINYL, METAL, WOOD, STRUCTURAL GLAZED TILE, & CERAMIC TILE	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	R<45d	R<45d	R>45d	R>45d
Inspect for:	=====	=====	=====	=====	=====	=====
Cracks, splits, & holes	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Sags & warp	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Chips & gouges	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Staining & discoloration	R	R	X	X	X	X
Rot	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Loose, broken, or missing sections	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Loose, broken, or missing grout	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Insect infestation	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Locate source of moisture penetration	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
=====	=====	=====	=====	=====	=====	=====

M&R activities as required:						
Repair or replace damaged areas	D/P/R R	R	X	X	X	X
Replace rotted sections	D/P/R D R D/P/R		X	X	X	X
Readhere loose sections	D/P/R R	R	X	X	X	X
Replace broken or missing sections	D/P/R R	R	X	X	X	X
Replace loose, broken, or missing grout	D/P/R R	R	X	X	X	X
Eradicate insect infestation	D/P/R D R D/P/R		X	X	X	X
Clean surfaces	R	R	X	X	X	X

# GENERAL BUILDING TYPES

## INTERIOR CONSTRUCTION - CEILINGS

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

CONCRETE CEILINGS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks & holes	D/P/R R		X	X	X	X
		R	X	X	X	X
Spalling & scaling	D/P/R R		X	X	X	X
		R	X	X	X	X
Staining & discoloration & mildew	R	R	X	X	X	X
Exposed reinforcing	D/P/R		X	X	X	X
		D R	X	X	X	X
		D/P/R		X		X
Damaged expansion joints	D/P/R		X	X	X	X
		D R	X	X	X	X
		D/P/R		X		X
Surface coat damage	D R D D/P/R D R		X	X	X	X
				X		X
Locate source of moisture penetration	D/P/R		X	X	X	X
		D R	X	X	X	X
		D/P/R		X		X

M&R activities as required:						
Repair cracks & holes	D/P/R R	R	X X	X X	X X	X X
Repair spalled or scaled area	D/P/R R	R	X X	X X	X X	X X
Clean rebar & adjacent concrete; coat rebar, patch area	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Replace rebar; clean adjacent concrete, patch area	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Repair expansion joints	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D D/P/R D R	D R D R	X	X	X	X

SUSPENDED METAL CEILINGS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Holes, dents, & gouges	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration	R	R	X	X	X	X
Corrosion	D/P/R D R D/P/R	R	X X	X X	X X	X X
Warp; loose sections	D/P/R R	R	X X	X X	X X	X X
Surface coat damage	D R D/P/R	D R D/P/R	X	X	X	X
Locate source of moisture penetration	D/P/R D R D/P/R	R	X X	X X	X X	X X
M&R activities as required:						
Replace sections	D/P/R R	R	X X	X X	X X	X X
Remove corrosion	D/P/R D R D/P/R	R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D/P/R	D R D/P/R	X	X	X	X

GYPSUM BOARD CEILINGS & PLASTER CEILINGS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, holes, & gouges	D/P/R R	R	X X	X X	X X	X X
Staining & discoloration	R	R	X	X	X	X
Moisture damage (including sugaring)	D/P/R R	R	X X	X X	X X	X X
Sagging	D/P/R R	R	X X	X X	X X	X X
Surface coat damage	D R D/P/R	D R	X	X	X	X
Locate source of moisture penetration	D/P/R	D R D/P/R	X X	X X	X X	X X
M&R activities as required:						
Patch cracks, holes, & gouges	D/P/R R	R	X X	X X	X X	X X
Repair moisture damage	D/P/R R	R	X X	X X	X X	X X
Reattach & plaster	D/P/R R	R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D/P/R	D R	X	X	X	X

ACOUSTICAL CEILINGS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, holes, & gouges	D/P/R R	R	X	X	X	X
Staining & discoloration	R	R	X	X	X	X
Warp; loose sections	D/P/R R	R	X	X	X	X
Broken or missing sections	D/P/R R	R	X	X	X	X
Misaligned trim	D/P/R R	R	X	X	X	X
Corroded or damaged trim	D/P/R R	R	X	X	X	X
Moisture damage	D/P/R D R D/P/R	R	X X	X X	X X	X X
Locate source of moisture penetration	D/P/R D R D/P/R	R	X X	X X	X X	X X

M&R activities as required:						
Replace damaged sections	D/P/R	R	X	X	X	X
Remove damaged sections		D/P	X	X	X	X
Adjust tiles & trim	D/P/R		X	X		
	R	R	X	X	X	X
Remove corrosion from trim & paint	D/P/R		X	X		
	R	R	X	X	X	X
Clean surfaces of trim		R	X	X	X	X



=====	=====	=====	=====	=====	=====	=====
EXPOSED CEILING INSULATION	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
=====	=====	=====	=====	=====	=====	=====
Inspect for:						
Wet insulation	D/P/R	D R	X X	X X	X X	X X
=====	=====	=====	=====	=====	=====	=====
Loose or missing insulation	R	R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====
Locate source of moisture penetration	D/P/R	D R	X X	X X	X X	X X
=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
Remove & replace wet insulation	D/P/R		X	X	X	X
=====	=====	=====	=====	=====	=====	=====
Remove wet insulation		D D/P	X	X	X	X
=====	=====	=====	=====	=====	=====	=====
Resecure loose insulation	R	R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====
Replace missing insulation	R	R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

# GENERAL BUILDING TYPES

## INTERIOR CONSTRUCTION - DOORS

NOTE: D = Deactivation P = Periodic R = Reactivation  
Pfr = Preferred Min = Minimal yr = year d = days

HOLLOW METAL DOORS & FRAMES & STEEL DOORS & FRAMES	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, holes, dents, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Surface abrasion & marring	D/P/R R		X	X	X	X
		R	X	X	X	X
Stains & discoloration	R	R	X	X	X	X
Malfunction & misalignment	D/P/R R		X	X	X	X
		R	X	X	X	X
Corrosion	D/P/R	D R	X	X	X	X
		D/P/R		X		X
Surface coat damage	D R D/P/R	D R D/P/R	X	X	X	X

M&R activities as required:						
Patch cracks, holes, dents, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Adjust alignment	D/P/R R		X	X	X	X
		R	X	X	X	X
Repair or replace doors & frames	D/P/R R		X	X	X	X
		R	X	X	X	X
Remove corrosion	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R	R R	X	X	X	X

METAL & GLASS DRS & FRAMES	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, holes, dents, & gouges	D/P/R R	R	X	X	X	X
Surface abrasion & marring	D/P/R R	R	X	X	X	X
Stains & discoloration	R	R	X	X	X	X
Malfunction & misalignment	D/P/R R	R	X	X	X	X
Corrosion	D/P/R D R D/P/R	R	X	X	X	X
Cracked, broken, or missing glass	D/P/R D R D/P/R	R	X	X	X	X
Surface coat damage	D R D/P/R	D R D/P/R	X	X	X	X

M&R activities as required:						
Patch cracks, holes, dents, & gouges	D/P/R R		X	X	X X	X X
Repair or replace doors & frames	D/P/R R		X	X	X X	X X
Remove corrosion	D/P/R	D R D/P/R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D/P/R	D R D/P/R	X	X	X	X
Replace cracked, broken, or missing glass	D/P/R R		X X	X X	X X	X X
If cracked, broken, or missing, board up opening	D/P	D D/P	X	X	X X	X X

WOOD DOORS & FRAMES	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, holes, & gouges	D/P/R		X	X		
	R	R	X	X	X	X
Surface abrasion & marring	D/P/R		X	X		
	R	R	X	X	X	X
Malfunction & misalignment	D/P/R		X	X		
	R	R	X	X	X	X
Warp	D/P/R		X	X		
	R	R	X	X	X	X
Rot	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X
Staining & discoloration	R	R	X	X	X	X
Insect infestation	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X
Surface coat damage	D R	D	X		X	
	D/P/R	D R		X		X

M&R activities as required:						
Patch cracks, holes, & gouges	D/P/R R	R	X	X	X	X
Repair damaged surfaces	D/P/R R	R	X	X	X	X
Repair or replace doors & frames	D/P/R R	R	X	X	X	X
Adjust alignment	D/P/R R	R	X	X	X	X
Replace rotted doors	D/P/R D R D/P/R	R	X X	X X	X X	X X
Eradicate insect infestation	D/P/R D R D/P/R	R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & stain or paint surfaces	D R D D/P/R D R	R	X	X	X	X

GLASS IN DOORS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracked, broken, or missing glass	D/P/R	D R D/P/R	X X	X X	X X	X X
Cracked, broken, or missing seals or gaskets	D/P/R	D R D/P/R	X X	X X	X X	X X
M&R activities as required:						
Replace cracked, broken, or missing glass	D/P/R R	R	X X	X X	X X	X X
If cracked, broken, or missing, board up opening	D/P	D D/P	X	X	X X	X X
Replace cracked, broken, or missing seals or gaskets	D/P/R R	R	X X	X X	X X	X X
If seals or gaskets are cracked, broken, or missing, board up opening	D/P	D D/P	X	X	X X	X X



LOUVERS IN DOORS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, chips, holes, dents, & gouges	D/P/R R	R	X X	X X	X X	X X
Malfunction & misalignment	D/P/R R	R	X X	X X	X X	X X
Broken or missing sections	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R	D R D/P/R	X X	X X	X X	X X
Surface coat damage	D R D/P/R	D R D/P/R	X	X	X	X
M&R activities as required:						
Patch cracks, chips, holes, dents, & gouges	D/P/R R	R	X X	X X	X X	X X
Repair damaged surfaces	D/P/R R	R	X X	X X	X X	X X
Repair or replace louvers or sections of louvers	D/P/R R	R	X X	X X	X X	X X
Remove corrosion	D/P/R	D R D/P/R	X X	X	X X	X X
Clean surfaces	R	R	X	X	X	X
Paint surfaces	D R D/P/R	D R D/P/R	X	X	X	X

DOOR HARDWARE	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Functioning hinges	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Broken or missing components	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Corrosion	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Malfunction & misalignment	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
M&R activities as required:						
Oil hinges	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Repair or replace components	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
Remove corrosion	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X

CAULKING	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Loose caulk	D/P/R R	R	X X	X X	X X	X X
Broken or missing caulk	D/P/R R	R	X X	X X	X X	X X
Eroded caulk	D/P/R R	R	X X	X X	X X	X X
M&R activities as required:						
Remove loose, broken, & eroded caulk	D/P/R R	R	X X	X X	X X	X X
Clean surfaces & recaulk	D/P/R R	R	X X	X X	X X	X X

# GENERAL BUILDING TYPES

## INTERIOR CONSTRUCTION - SPECIALTIES

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

METAL TOILET PARTITIONS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, chips, holes, dents, & gouges	D/P/R R	R	X	X	X	X
Corrosion	D/P/R R	R	X	X	X	X
Loose, broken, or missing supports or hardware	D/P/R R	R	X	X	X	X
Surface coat damage	D R D R D/P/R D/P/R		X	X	X	X

M&R activities as required:						
Repair cracks, chips, holes, dents, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Repair or replace sections	D/P/R R		X	X	X	X
		R	X	X	X	X
Remove corrosion	D/P/R R		X	X	X	X
		R	X	X	X	X
Resecure or replace supports and hardware	D/P/R R		X	X	X	X
		R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D/P/R	D R D/P/R	X	X	X	X

=====	=====	=====	=====	=====	=====	=====
TOILET & BATH ACCESSORIES	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	=====	=====	=====	=====
Inspect for:			R<45d	R<45d	R>45d	R>45d
=====	=====	=====	=====	=====	=====	=====
Cracks, chips, holes, dents, gouges, & deformation	D/P/R R		X	X	X	X
		R	X	X	X	X
Corrosion	D/P/R R		X	X	X	X
		R	X	X	X	X
Loose fit	D/P/R R		X	X	X	X
		R	X	X	X	X
Loose, broken, or missing accessories	D/P/R R		X	X	X	X
		R	X	X	X	X
Malfunction	D/P/R R		X	X	X	X
		R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
Repair or replace accessories	D/P/R R		X	X	X	X
		R	X	X	X	X
Remove corrosion	D/P/R R		X	X	X	X
		R	X	X	X	X
Secure fit	D/P/R R		X	X	X	X
		R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

METAL WALL LOUVERS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, chips, holes, dents, & gouges	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R R	R	X X	X X	X X	X X
Loose, broken, or missing sections & fasteners	D/P/R R	R	X X	X X	X X	X X
Surface coat damage	D R D R D/P/R D/P/R		X	X	X	X
M&R activities as required:						
Repair cracks, chips, holes, dents, & gouges	D/P/R R	R	X X	X X	X X	X X
Repair or replace sections	D/P/R R	R	X X	X X	X X	X X
Remove corrosion	D/P/R R	R	X X	X X	X X	X X
Resecure loose fasteners	D/P/R R	R	X X	X X	X X	X X
Replace broken or missing sections & fasteners	D/P/R R	R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D R D/P/R D/P/R		X	X	X	X

METAL GRILLES & SCREENS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, holes, dents, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Corrosion	D/P/R R		X	X	X	X
		R	X	X	X	X
Loose, broken, or missing sections & fasteners	D/P/R R		X	X	X	X
		R	X	X	X	X
Surface coat damage	D R D R D/P/R D/P/R		X	X	X	X
M&R activities as required:						
Repair cracks, holes, dents, & gouges	D/P/R R		X	X	X	X
		R	X	X	X	X
Remove corrosion	D/P/R R		X	X	X	X
		R	X	X	X	X
Resecure loose fasteners	D/P/R R		X	X	X	X
		R	X	X	X	X
Replace broken or missing sections & fasteners	D/P/R R		X	X	X	X
		R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D R D/P/R D/P/R		X	X	X	X



IDENTIFYING DEVICES: BULLETIN BOARDS, INTERIOR SIGNS, DIRECTORIES, ETC.	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, chips, holes, dents, & gouges	R	R	X	X	X	X
Corrosion	R	R	X	X	X	X
Loose, broken, or missing sections & fasteners	R	R	X	X	X	X
Surface coat damage	R	R	X	X	X	X
M&R activities as required:						
Repair cracks, chips, holes, dents, & gouges	R	R	X	X	X	X
Remove corrosion	R	R	X	X	X	X
Resecure loose fasteners	R	R	X	X	X	X
Replace broken or missing sections & fasteners	R	R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	R	R	X	X	X	X

METAL LOCKERS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, chips, holes, dents, gouges, & deformation	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R R	R	X X	X X	X X	X X
Loose, broken, or missing sections, supports, & hardware	D/P/R R	R	X X	X X	X X	X X
Surface coat damage	D R D R D/P/R D/P/R		X	X	X	X
M&R activities as required:						
Repair cracks, chips, holes, dents, gouges, & deformation	D/P/R R	R	X X	X X	X X	X X
Remove corrosion	D/P/R R	R	X X	X X	X X	X X
Resecure loose sections, supports, & hardware	D/P/R R	R	X X	X X	X X	X X
Repair or replace broken or missing sections, supports, or hardware	D/P/R R	R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D R D/P/R D/P/R		X	X	X	X

FIRE PROTECTION CABINETS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, chips, holes, dents, & gouges	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R R	R	X X	X X	X X	X X
Loose, broken, or missing cabinets, supports, or hardware	D/P/R R	R	X X	X X	X X	X X
Cracked, broken, or missing glass	D/P/R R	R	X X	X X	X X	X X
Surface coat damage	D R D R D/P/R D/P/R		X	X	X	X
M&R activities as required:						
Repair cracks, chips, holes, dents, & gouges	D/P/R R	R	X X	X X	X X	X X
Remove corrosion	D/P/R R	R	X X	X X	X X	X X
Resecure loose cabinets, supports, & hardware	D/P/R R	R	X X	X X	X X	X X
Repair or replace broken or missing cabinets, supports, or hardware	D/P/R R	R	X X	X X	X X	X X
Replace cracked, broken, or missing glass	D/P/R R	R	X X	X X	X X	X X
Prepare & paint surfaces	D R D R D/P/R D/P/R		X	X	X	X

STORAGE SHELVING	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, splits, & holes	D/P/R R		X	X	X	X
		R	X	X	X	X
Dents, gouges, & chips	D/P/R R		X	X	X	X
		R	X	X	X	X
Sags & warp	D/P/R R		X	X	X	X
		R	X	X	X	X
Corrosion	D/P/R R		X	X	X	X
		R	X	X	X	X
Rot	D/P/R		X	X	X	X
		D R	X	X	X	X
		D/P/R		X		X
Insect infestation	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
Loose, broken, or missing shelving, supports, or hardware	D/P/R R		X	X	X	X
		R	X	X	X	X
Surface coat damage	D R D/P/R	D R	X	X	X	X
		D R		X		X

M&R activities as required:						
Repair cracks, splits, holes, dents, gouges, & chips	D/P/R R	R	X X	X X	X X	X X
Remove corrosion	D/P/R R	R	X X	X X	X X	X X
Replace rotted sections	D/P/R	D R D/P/R	X X	X X	X X	X X
Eradicate insect infestation	D/P/R	D R D/P/R	X X	X X	X X	X X
Resecure loose shelving, supports & hardware	D/P/R R	R	X X	X X	X X	X X
Repair or replace broken or missing shelving, supports, or hardware	D/P/R R	R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D/P/R	D R	X	X	X	X

CLOSET SPECIALTIES	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, splits, holes, & deformation	D/P/R R	R	X X	X X	X X	X X
Dents, gouges, & chips	D/P/R R	R	X X	X X	X X	X X
Sags & warp	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R R	R	X X	X X	X X	X X
Rot	D/P/R D R D/P/R		X X	X X	X X	X X
Insect infestation	D/P/R D R D/P/R		X X	X X	X X	X X
Loose, broken, or missing specialties, supports, or hardware	D/P/R R	R	X X	X X	X X	X X
Surface coat damage	D R D D/P/R D R		X X	X X	X X	X X

M&R activities as required:						
Repair cracks, chips, holes, dents, gouges, & deformation	D/P/R R	R	X X	X X	X X	X X
Remove corrosion	D/P/R R	R	X X	X X	X X	X X
Replace rotted sections	D/P/R D R D/P/R		X X	X X	X X	X X
Resecure loose specialties, supports, & hardware	D/P/R R	R	X X	X X	X X	X X
Repair or replace broken or missing specialties, supports, & hardware	D/P/R R	R	X X	X X	X X	X X
Eradicate insect infestation	D/P/R D R D/P/R		X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & paint surfaces	D R D/P/R	D R	X	X	X	X

CASEWORK	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Cracks, splits, holes, & deformation	D/P/R R		X	X	X	X
		R	X	X	X	X
Dents, gouges, & chips	D/P/R R		X	X	X	X
		R	X	X	X	X
Sags & warp	D/P/R R		X	X	X	X
		R	X	X	X	X
Corrosion	D/P/R R		X	X	X	X
		R	X	X	X	X
Rot	D/P/R		X	X	X	X
		D R	X	X	X	X
		D/P/R		X		X
Insect infestation	D/P/R		X	X	X	X
		D R	X	X	X	X
		D/P/R		X		X
Loose, broken, or missing specialties, supports, or hardware	D/P/R R		X	X	X	X
		R	X	X	X	X
Surface coat damage	D R D D/P/R D R		X	X	X	X



M&R activities as required:						
Repair cracks, chips, holes, dents, gouges, & deformation	D/P/R R	R	X X	X X	X X	X X
Remove corrosion	D/P/R R	R	X X	X X	X X	X X
Replace rotted sections	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Resecure loose specialties, supports, & hardware	D/P/R R	R	X X	X X	X X	X X
Repair or replace broken or missing specialties, supports, & hardware	D/P/R R	R	X X	X X	X X	X X
Eradicate insect infestation	D/P/R D R D/P/R	D R D/P/R	X X	X X	X X	X X
Clean surfaces	R	R	X	X	X	X
Prepare & refinish or paint surfaces	D R D/P/R	D R D R	X	X	X	X

WOOD BLEACHERS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Cracks, splits, holes, & deformation	D/E/R R	R	X X	X X	X X	X X
Dents, gouges, & chips	D/P/R R	R	X X	X X	X X	X X
Bags & warp	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R D R D/P/R	R	X X	X X	X X	X X
Rot	D/P/R D R D/P/R	R	X X	X X	X X	X X
Insect infestation	D/P/R D R D/P/R	R	X X	X X	X X	X X
Loose, broken, or missing sections, supports, & hardware	D/P/R R	R	X X	X X	X X	X X
Proper operation	R	R	X	X	X	X
Surface coat damage	D R D/P/R	D R	X	X	X	X

M&R activities as required:						
Repair cracks, chips, holes, dents, gouges, & deformation	D/P/R R		X	X	X	X
		R	X	X	X	X
Remove corrosion	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace rotted sections	D/P/R		X	X	X	X
		D R	X	X	X	X
		D/P/R	X	X	X	X
Resecure loose sections, supports, & hardware	D/P/R R		X	X	X	X
		R	X	X	X	X
Repair or replace broken or missing sections, supports, & hardware	D/P/R R		X	X	X	X
		R	X	X	X	X
Eradicate insect infestation	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Clean surfaces	R	R	X	X	X	X
Repair or replace operating mechanism to assure proper operation	R	R	X	X	X	X
Prepare & refinish or paint surfaces	D R D/P/R	D R	X	X	X	X

VENETIAN BLINDS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Malfunction	D/P/R		X	X		
	R		X	X	X	X
Loose, broken or missing supports and hardware	D/P/R		X	X		
	R		X	X	X	X
Dented, broken, or missing blades	D/P/R		X	X		
	R		X	X	X	X
M&R activities as required:						
Restore to proper functioning order	D/P/R		X	X		
	R		X	X	X	X
Repair or replace supports or hardware	D/P/R		X	X		
	R		X	X	X	X
Repair or replace blades	D/P/R		X	X		
	R		X	X	X	X
Clean venetian blinds	R	R	X	X	X	X

# GENERAL BUILDING TYPES

## INTERIOR CONSTRUCTION - EXPOSED STRUCTURAL ELEMENTS

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

			D<1yr	D>1yr	D<1yr	D>1yr
TRUSSES	Pfr	Min	R<45d	R<45d	R>45d	R>45d
Inspect for:						
Excessive deflection * (greater than L/180)	D/P/R	D R D/P/R	X X	X X	X X	X X
Twisted or bowed members *	D/P/R	D R D/P/R	X X	X X	X X	X X
Decay or rot	D/P/R	D R D/P/R	X X	X X	X X	X X
Checks and splits *	D/P/R R	R	X X	X X	X X	X X
Separation or slippage at joints	D/P/R R	R	X X	X X	X X	X X
Loose connections, bolts, rivets	D/P/R R	R	X X	X X	X X	X X
Corrosion	D/P/R	D R D/P/R	X X	X X	X X	X X
Rupture, shearing or crushing of steel plates, members, bolts and rivets *	D/P/R R	R	X X	X X	X X	X X

NOTE: The items marked with an asterisk (\*) can develop into a serious structural problem. If the cause of the defect or local failure is not immediately discernible or if the corrective measures are not straightforward, consultation and advice should be obtained from a qualified architect or structural engineer.

M&R activities as required:						
Determine and relieve cause of overload	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace rotted member, eliminate cause, ventilate area	D/P/R	R	X	X	X	X
		R	X	X	X	X
Close split with stitch bolts or clamps *	D/P/R	R	X	X	X	X
		R	X	X	X	X
Tighten or replace bolts	D/P/R	R	X	X	X	X
		R	X	X	X	X
Remove minor corrosion, eliminate source of moisture	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X

=====	=====	=====	=====	=====	=====	=====
ROOF RAFTERS AND PURLINS (pitched and flat)	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	=====	=====	=====	=====
Inspect for:			R<45d	R<45d	R>45d	R>45d
=====	=====	=====	=====	=====	=====	=====
Sagging of roof (flat) *	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Ridge sagging (pitched) *	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Loose bolts or nails	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Cracked, split or broken members *	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Insect damage	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
Tighten bolts or secure nails	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace member if insect damage is extensive, elimi- nate cause	D/P/R		X	X	X	X
		D R	X		X	
		D/P/R		X		X
-----	-----	-----	-----	-----	-----	-----
Strengthen split or broken members *	D/P/R		X	X		
	R				X	X
		R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

JOISTS, BEAMS & GIRDERS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Excessive deflection (all) (greater than L/240) *	D/P/R	D R	X X	X X	X X	X X
Loose bridging (wood)	D/P/R	R	X X	X X	X X	X X
Insecure nailing (wood)	D/P/R	R	X X	X X	X X	X X
Insect damage or rot (wood)	D/P/R	D R	X X	X X	X X	X X
Insufficient bearing * (all)	D/P/R	R	X X	X X	X X	X X
Checks and splits *	D/P/R	R	X X	X X	X X	X X
Poor quality welds (steel)	D/P/R	R	X X	X X	X X	X X
Corrosion (steel) *	D/P/R	D R	X X	X X	X X	X X
Localized buckling at or near ends of supports *	D/P/R	D R	X X	X X	X X	X X
Distorted seat angle * (steel)	D/P/R	R	X X	X X	X X	X X
Cracks near supports * (concrete)	D/P/R	R	X X	X X	X X	X X



M&R activities as required:						
Secure bridging and nails	D/P/R		X	X		
	R		X	X	X	X
Replace rotted member, eliminate cause, ventilate area	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X
Remove minor corrosion, eliminate source of moisture	D/P/R		X	X	X	X
	D R		X		X	
	D/P/R			X		X

COLUMNS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect for:						
Out of plumb, buckled or bowed *	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Evidence of water problems at base plate	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Rot or deterioration	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Checks or splits at connections *	D/P/R	R	X	X	X	X
		R	X	X	X	X
Corrosion	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Cracking of concrete cover, exposing reinforcing *	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Rust staining on concrete *	D/P/R	R	X	X	X	X
		R	X	X	X	X
Cracking at column/slab interface *	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
M&R activities as required:						
Identify and remedy water problem	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Replace rotted member, eliminate cause, ventilate area	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X
Remove minor corrosion, eliminate source of moisture	D/P/R	D R	X	X	X	X
		D/P/R	X	X	X	X

## **APPENDIX E:**

### **INSPECTION AND M&R CHECKLISTS FOR INTERIOR ELECTRICAL SYSTEMS**

#### **General Notes**

The accompanying procedural checklists cover general activities for deactivation, periodic maintenance, and component reactivation. Special care should be exercised to ensure that dissimilar metals are not left in contact when circuits and switchgear are deenergized. Additionally, all electrical enclosures should be sealed as much as practicable to avoid moisture intrusion.

Emergency and security systems should be kept energized. These systems include fire alarm, security lights, sump pumps, and the emergency monitoring and control system (EMCS) if used. These circuits should be adequately marked for easy verification of condition and service by personnel performing periodic and emergency maintenance.

The electrical systems should be inspected for proper operation and degradation during semiannual inspections and after severe thunderstorms or floods. Every attempt should be made to ensure the fire, security, and EMCS systems are maintained in good condition. Special care should be exercised to prevent moisture intrusion and resulting corrosion damage (or fire and life-safety concerns) in these components and systems.

It is possible that semiannual inspections and maintenance may not be adequate for some unique equipment. Manufacturer's literature should be used to help determine the appropriate inspection and schedule maintenance frequency. The National Fire Protection Association document NFPA 70B, *Recommended Practice for Electrical Equipment Maintenance*, and the Westinghouse text *Electrical Maintenance Hints* should be used for further guidance on frequency and type of maintenance activities for various electrical system components.

An appropriate recordkeeping system and routine tagging of equipment requiring repair should be initiated at the time of facility deactivation. This will help ensure that critical components and systems are identified and repaired in a timely fashion. All switchgear, transformation equipment, conductor connections, and circuit breakers or fuses must be periodically inspected for poor connections, corrosion, or other moisture damage. These conditions could lead to overheating of components, even in a lightly loaded circuit. Insulations should be inspected for degradation and all grounding equipment should be tested for proper operation.

### **Subcomponent List for Interior Electrical System**

*Thermal Circuit Breakers/Panels*

*Mechanical Circuit Breakers and Boxes*

*Fused Links and Fuses*

*Motor Control Centers*

*EMCS Panels*

*Transformation Equipment*

*Conductors (Wiring)*

*Switches*

*Outlets*

*Security Lights*

*Exit Lights*

*Interior Lighting (Flourescent and Incandescent)*

*Fire Detection/Alarm System*

# GENERAL BUILDING TYPES

## INTERIOR ELECTRICAL

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

ELECTRICAL EQUIPMENT	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
INSPECT FOR:						
All equipment containing insulating oil (transformers)	D/R	D/R	X	X	X	X
Insure power is on to sump pump, security lights	D	D	X	X	X	X
Breaker panel moisture, animal intrusion/degradation (QUARTERLY)	P			X		X
Fire/security/sump systems for proper operation (90 days)	D/P/R		X	X	X	X
Security lights	R P	R P	X	X X	X	X X
Lights, outlets and switches for corrosion or other degradation	R	R	X	X	X	X
M & R ACTIVITIES						
De-energize all unneeded lights, outlets, motors at main breaker panels	D	D	X	X	X	X
Lubricate all mechanical operating linkages	D		X	X	X	X

# GENERAL BUILDING TYPES

## BUILDING ELECTRICAL

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

ELECTRICAL EQUIPMENT (CONTINUED)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
M & R ACTIVITIES						
Touch up paint to prevent corrosion	D P		X	X X	X	X X
Add oil where re- quired	D		X	X	X	X
Install induction heaters in all de- energized electri- cal panels to con- trol humidity (10 watts/cubic foot)	D			X		X
Seal all breaker panels to prevent moisture intrusion	D	D	X	X	X	X
Remove fuses from unused circuits and plastic bag	D			X		X
Insure that power is on to security and fire systems	D	D	X	X	X	X
Replace security lights as required	D/P/R	D/P/R	X	X	X	X
Log any failed com- ponents for reakti- vation repair	P	P		X		X
Repair fire and security system as required	D/P/R	D/P/R	X	X	X	X

# GENERAL BUILDING TYPES

## BUILDING ELECTRICAL

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

ELECTRICAL EQUIPMENT (CONTINUED)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
M & R ACTIVITIES						
Remove heaters from all panels and clean contacts. Check circuit breaker operation	R			X		X
Check all breakers for corrosion and clean or repair. Test all circuits	R	R	X	X	X	X
Perform load survey to insure adequacy for expected loads	R		X	X	X	X
Check all lights, outlets & switches	R	R	X	X	X	X
Replace/repair all lights outlets and switchgear which does not meet code	R	R	X	X	X	X
Reactivate circuits one at a time and insure proper oper- ation	R	R	X	X	X	X

# GENERAL BUILDING TYPES

## INTERIOR ELECTRICAL - SUMP PUMPS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

SUMP PUMPS AND MOTORS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
INSPECT FOR:						
Proper operation of sump pump; quarterly with checks after major rain and lightning	D/P/R	D/P/R	X	X	X	X
Pump motor corrosion (quarterly)	P		X	X	X	X
M & R ACTIVITIES						
Repair or replace pump, motor, components as required	D/P/R	D/P/R	X	X	X	X
Clean or replace strainer and plumbing to drain	D/R		X	X	X	X
Clean, dry and paint sump pump, motor, access cover	D		X	X	X	X
Steam clean and paint pump motor if corrosion is found	D/P/R		X	X	X	X
Perform low voltage ohm-meter test on sump pump motors for insulation	R		X	X	X	X



# GENERAL BUILDING TYPES

## INTERIOR ELECTRICAL - SUMP PUMPS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

SUMP PUMPS AND MOTORS (CONTINUED)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
M & R ACTIVITIES						
Perform low voltage ohm-meter test on 10% of pump motors for proper insula- tion		R		X		X
Dry in a suitable oven any pump motor having low insula- tion resistance	R	R	X	X	X	X
Hand test pump motor for ease of rotation	P/R	P/R	X	X	X	X
Test pump motor under load and in- sure required flow	D/R		X	X	X	X

## **APPENDIX F:**

### **INSPECTION AND M&R CHECKLISTS FOR PLUMBING**

#### **General Notes**

This checklist is essentially a shutdown and startup procedure. Very little inspection is needed since the system will be shut down and drained. It is important that the steps be followed in the sequence listed.

If the buildings are going to be heated, only the valve to the *domestic water* side of the system is to be closed. The supply of domestic water to the building heating system cannot be shut off because makeup water will be required if buildings are to be maintained at 40 to 45 °F. If the buildings are not going to be heated, the domestic water supply to the building heating system may be shut off. Make sure that the valve is opened when the building is reactivated.

The periodic inspection (Preferred option) should be carried out annually. Failure to inspect and replenish propylene glycol (so traps remain sealed) may result in seepage of hydrogen sulfide/sewer gas into the building. This should not affect the plumbing system, but is hazardous to people and may accelerate deterioration of paint and metallic components.

It is acceptable to use alcohol-based windshield washer fluid in place of propylene glycol to seal the traps.

If the plumbing system is deactivated for 6 months or longer, the valve packing and washers in the components that contain them should be replaced at the time of reactivation, because the material will age and lose its resiliency in a dry system.

# GENERAL BUILDING TYPES

## PLUMBING

NOTE: D = Deactivation P = Periodic R = Reactivation Pfr = Preferred Min = Minimal yr = year d = days

	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect:						
Drains and traps to insure that there is enough propylene glycol remaining to seal them.	P		X	X	X	X
Breakage, vandalism, stolen property	P,R	R	X	X	X	X
M & R activities:						
Flush all urinals and water closets once.	D	D	X	X	X	X
Close valves inside the building to the domestic water side of the system.	D	D	X	X	X	X
Shut off energy to domestic hot water heaters/ tanks.	D	D	X	X	X	X
Drain all water heaters/ storage tanks.	D	D	X	X	X	X
Drain the closed/shut off domestic hot and cold water lines.	D	D	X	X	X	X
Drain lines to and from each urinal and water closet.	D	D	X	X	X	X

	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Dismantle valve/stop (flushometer) for each urinal or water closet and store components in a non-biodegradable bag attached to unit.	D		X	X	X	X
Drain lines to and from each shower.	D	D	X	X	X	X
Dismantle shower valves and store components in a non-biodegradable bag attached to unit.	D		X	X	X	X
Drain lines to and from each lavatory.	D	D	X	X	X	X
Drain lines to and from each service sink.	D	D	X	X	X	X
Drain lines to and from each laundry tray.	D	D	X	X	X	X
Drain lines to and from each automatic clothes washer and drain associated hoses and pump.	D	D	X	X	X	X
Drain lines to and from each drinking fountain and associated tank.	D	D	X	X	X	X
Remove any remaining water from lines by blowing compressed air through the system.	D	D	X	X	X	X
Add propylene glycol (antifreeze) to all floor drains and traps.	D	D	X	X	X	X
Add propylene glycol to traps or drains requiring it.	P		X	X	X	X

	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Repair broken/missing pipes/fixtures if necessary for safety or other critical reason. Otherwise, just note it.	P		X	X	X	X
Repair all broken/missing fixtures/piping.	R	R	X	X	X	X
Restore valve/stop on each water closet and urinal to working condition according to the ONE procedure below that applies to the situation:	R	R	X	X	X	X
A. PREFERRED ONLY; Re-assemble valve/stop using appropriate flush and handle kits						
OR						
B. MINIMAL; VALVE IN USABLE CONDITION: Disassemble valve/stop and reassemble using new kits.						
OR						
C. MINIMAL; VALVE IN UNUSABLE CONDITION: Replace entire valve/stop.						

	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Restore each shower valve to working condition according to the ONE procedure below that applies to the situation:	R	R	X	X	X	X
A. PREFERRED ONLY: Re-assemble shower valve, replacing washers and packing.						
OR						
B. MINIMAL; VALVE IN USABLE CONDITION: Disassemble valve and reassemble using new washers and packing.						
OR						
C. MINIMAL; VALVE IN UNUSABLE CONDITION: Replace entire valve.						
Replace washers and packing on faucets for each lavatory.	R	R	X	X	X	X
Replace washers and packing on faucets for each service sink.	R	R	X	X	X	X
Replace washers and packing on faucets for each laundry tray.	R	R	X	X	X	X

	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Replace hoses, washers, and packing for each automatic clothes washer. Replace unit if necessary.	R	R	X	X	X	X
Replace pressure regulator, washers, and packing for each drinking fountain. Replace unit if necessary.	R	R	X	X	X	X
Slowly open valve(s) inside each building to domestic water side of system.	R	R	X	X	X	X
Check for leaks as taps/units are individually activated. Repair leaks.	R	R	X	X	X	X
Fill lines, tanks, and heater. Check for proper operation and pressure.	R	R	X	X	X	X
Restore energy to hot water heaters/ tanks.	R	R	X	X	X	X
Flush all floor drains and traps to remove propylene glycol.	R	R	X	X	X	X
Check drain lines for leaks after flushing water closets and urinals or running water in sinks or other units. Repair leaks.	R	R	X	X	X	X

## **APPENDIX G:**

### **INSPECTION AND M&R CHECKLISTS FOR BUILDING HEATING SYSTEMS**

#### **General Notes on Building Heating Systems**

The term *building heating systems* refers to all heating equipment within a building that uses steam generated at a central boiler plant. It does not include the steam distribution system outside the building, but does include such components as pressure-reducing stations, steam-to-hot-water converters, flash and expansion tanks, condensate and hot water circulation pumps, condensate receivers, etc. Differences in procedures for the deactivation, periodic maintenance, and reactivation of building heating systems primarily depend on whether heat will be supplied to the building (reactivation less than 45 days) or will not be supplied to the building (reactivation greater than 45 days).

Deactivation procedures for the no-heat scenario involve the draining and drying of building heating system components. Under such conditions, periodic inspection and maintenance procedures are very minimal, involving essentially only walk-through inspection for signs of external sweating and corrosion of various components, and the appropriate corrective action where needed. Where heat is provided to the buildings, a fairly rigorous preventive maintenance program is recommended. Costs of such maintenance should be easily recovered in savings in boiler fuel costs that would otherwise be spent to compensate for live steam leaks, faulty steam traps, and inoperative condensate return systems.

Preventive maintenance costs for a deactivation period of less than 1 year are based on 1-year costs. Preventative maintenance costs for a deactivation period of longer than 1 year are based on costs for a 10-year deactivation period. Costs for the "Do Nothing" scenario are based on total system replacement.

#### **Subcomponent List for Building Heating Systems**

*Condensate Receiver*  
*Steam-to-Hot-Water Converter*  
*Condensate Pump and Motor*  
*Expansion Tank*  
*Flash Tank*  
*Hot Water Generator (Steam Side)*  
*Hot Water Heating Supply and Return Piping in Buildings*  
*Hot Water Circulation Pump and Motor*  
*Pressure-Reducing Station*  
*Radiator*  
*Steam-Supply and Return Piping in Buildings*  
*Steam Supply Line Traps and Strainers*



# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

CONDENSATE RECEIVER	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect:						
Receiver for leaks and proper operation	D/P	D	X	X		
	R	P		X		
		R	X		X	X
Receiver for evidence of sweating and corrosion	P/R	R			X	X
		P				X
M & R activities:						
Repair or replace receiver where necessary	D/P	D	X	X		
	R	P		X		
		R	X		X	X
Drain receiver	D	D			X	X
Clean out deposits, mud, scale, etc. Wire brush where necessary	D				X	X
Paint interior surfaces of receiver	D				X	X
Clean corrosion from receiver where necessary	P		X	X		
	R	P		X		
		R			X	X
Provide portable heating to control sweating and corrosion where necessary	P	P			X	X
Reconnect piping	R	R			X	X

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

STEAM TO HOT WATER CONVERTER	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect:						
Converter for leaks and proper operation	D P R	D P R	X X X	X X X	X X X	X X X
Converter for missing or deteriorated insulation	D P R	D P R	X X X	X X X	X X X	X X X
Converter for evidence of sweating and corrosion	P	P			X	X X
M & R activities:						
Repair or replace con- verter where necessary	D P R	D P R	X X X	X X X	X X X	X X X
Replace missing or de- teriorated insulation	D P R	D P R	X X X	X X X	X X X	X X X
Flush converter steam coil with fresh water	D	D			X	X
Drain converter	D	D			X	X
Dry converter steam coil using compressed air	D				X	X

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation      Pfr = Preferred  
P = Periodic      Min = Minimal  
R = Reactivation      yr = year  
d = days

	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
STEAM TO HOT WATER CONVERTER (continued)			R<45d	R<45d	R>45d	R>45d
Dry converter hot water side using compressed air	D				X	X
Provide portable heating to control sweating and corrosion where neces- sary	P	P			X	X X

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

CONDENSATE PUMP AND MOTOR	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect:						
Pump for leaks	D P R	D P R	X X X	X X X	X X X	X X X
Pump for proper operation	D P R	D P R	X X X	X X X	X X X	X X X
Pump and pump motor for corrosion	P	P			X	X X
M & R activities:						
Repair or replace pump where necessary	D P R	D P R	X X X	X X X	X X X	X X X
Flush pump with fresh water and drain	D	D			X	X
Coat interior surfaces with engine preservative oil MIL-L-21260, grade 2, by spraying or fogging while slowly actuating the pump	D	D			X	X
Cover shaft with compound preservative, Specification MIL-C-11796B, class 2	D	D			X	X

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
CONDENSATE PUMP AND MOTOR (continued)						
Seal all pump openings with pressure sensitive tape, MIL-T-4053B	D	D			X	X
Clean and paint pump and motor where necessary	D/P	D P			X	X X
Lubricate pump and pump motor	P R	P R		X	X	X
Remove pressure sensitive tape from pump openings	R	R			X	X
Remove all internal and external protective coat- ings	R	R			X	X
Hand test pump for ease of rotation	R	R				X
Perform low voltage ohm- meter test on pump motor for proper insulation	R				X	X
Perform low voltage ohm- meter test on 10% of pump motors for proper insula- tion		R			X	X
Dry in a suitable oven any pump motor having low insulation resistance	R	R			X	X
Hand test pump motor for ease of rotation	R	R				X
Test run pump motor under load for 4 or more hours	R	R				X

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

EXPANSION TANK	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect:						
Tank for leaks	D P R	D P R	X X X	X X X	X X X	X X X
Tank for evidence of sweating and corrosion	P	P R			X X	X X
M & R activities:						
Repair tank leaks or replace tank where necessary	D P R	D P R	X X X	X X X	X X X	X X X
Flush tank with fresh water and drain	D	D			X	X
Clean out deposits, mud, scale, etc. Wire brush where necessary	D				X	X
Spray or fog interior surfaces of tank with preservative (MIL-C-16173 C)	D				X	X
Clean corrosion from tank where necessary	P	P R			X X	X X
Provide portable heat to control sweating and corrosion where necessary	P	P			X	X X
Reconnect piping	R	R			X	X

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

FLASH TANK	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Inspect:						
Tank for leaks	D P R	D P R	X X X	X X X	X X X	X X X
Tank for evidence of sweating and corrosion	P R	P R			X X	X X
M & R activities:						
Repair tank leaks or replace tank where necessary	D P R	D P R	X X X	X X X	X X X	X X X
Flush tank with fresh water and drain	D	D			X	X
Clean out deposits, mud, scale, etc. Wire brush where necessary	D				X	X
Spray or fog interior surfaces of tank with preservative (MIL-C-16173 C)	D				X	X
Clean corrosion from tank where necessary	P R	P R			X X	X X
Provide portable heat to control sweating and corrosion where necessary	P	P			X	X X
Reconnect piping	R	R			X	X

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

HOT WATER GENERATOR (STEAM SIDE)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect:						
Heater coil for leaks	R	R	X	X	X	X
M & R activities:						
Flush heater coil with fresh water and drain	D	D	X	X	X	X
Dry heater coil with com- pressed air	D		X	X	X	X
Repair heater coil leaks where necessary	R	R	X	X	X	X



# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

HOT WATER HEATING SUPPLY AND RETURN PIPING IN BUILDINGS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect:						
Supply and return lines for leaks	D P R	D P R	X X X	X X X	X X X	X X X
Supply line for missing or deteriorated insula- tion	D P R	D P R	X X X	X X X	X X X	X X X
M & R activities:						
Repair supply and return line leaks	D P R	D P R	X X X	X X X	X X X	X X X
Replace missing or dete- riorated supply line in- sulation	D P R	D P R	X X X	X X X	X X X	X X X
Flush supply and return lines with fresh water	D/R	D/R			X	X
Drain supply and return lines	D	D			X	X
Dry supply and return lines with compressed air	D				X	X
Cover all supply and re- turn line openings with caps, blank flanges, or wooden plugs	D	D			X	X

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

HOT WATER HEATING SUPPLY AND RETURN PIPING IN BUILDINGS (continued)	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Coat all pipe threads and finished surfaces left exposed by disconnecting for draining with a film of graphite and oil	D	D			X	X
Remove all preservatives from flanges, nipples, and threaded openings	R	R			X	X
Remove all blanks in sup- ply and return lines and reconnect piping	R	R			X	X

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
HOT WATER CIRCULATION PUMP AND MOTOR			R<45d	R<45d	R>45d	R>45d
Inspect:						
Pump for leaks	D P R	D P R	X X X	X X X	X X X	X X X
Pump for proper operation	D P R	D P R	X X X	X X X	X X X	X X X
Pump and pump motor for corrosion	P	P			X	X X
M & R activities:						
Repair or replace pump where necessary	D P R	D P R	X X X	X X X	X X X	X X X
Flush pump with fresh water and drain	D	D			X	X
Coat interior surfaces with engine preservative oil MIL-L-21260, grade 2, by spraying or fogging while slowly actuating the pump	D	D			X	X
Cover shaft with compound preservative, Specifica- tion MIL-C-11796B, class 2	D	D			X	X

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

HOT WATER CIRCULATION PUMP AND MOTOR (con- tinued)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Seal all pump openings with pressure sensitive tape, MIL-T-4053B	D	D			X	X
Clean and paint pump and motor where necessary	D/P	D P			X	X X
Lubricate pump and pump motor	P R	P R		X	X	X
Remove pressure sensitive tape from pump openings	R	R			X	X
Remove all internal and external protective coat- ings	R	R			X	X
Hand test pump for ease of rotation	R	R				X
Perform low voltage ohm- meter test on pump motor for proper insulation	R				X	X
Perform low voltage ohm- meter test on 10% of pump motors for proper insula- tion		R			X	X
Dry in a suitable oven any pump motor having low insulation resistance	R	R			X	X
Hand test pump motor for ease of rotation	R	R				X
Test run pump motor under load for 4 or more hours	R	R				X

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
=====						
Inspect:						
=====						
Pressure-reducing station for leaks	D P R	D P R	X X X	X X X	X X X	X X X
Pressure-reducing station for proper operation	D P R	D P R	X X X	X X X	X X X	X X X
=====						
M & R activities:						
=====						
Repair pressure-reducing station leaks	D P R	D P R	X X X	X X X	X X X	X X X
Repair or adjust pressure-reducing valve where necessary	D P R	D P R	X X X	X X X	X X X	X X X
Replace pressure-reducing valve where necessary	D P R	D P R	X X X	X X X	X X X	X X X
Open and drain equalizing pipe between diaphragm chamber and low side of system	D	D			X	X
Open all valves and clean internally	D				X	X
=====						

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

PRESSURE-REDUCING STATION (continued)	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
Loosen lower section of pressure-reducing valve to provide drainage	D	D			X	X
Coat all working parts and machined surfaces with a light oil coating	D	D			X	X
Open vents on the low pressure side of the pressure-reducing valve	D	D			X	X
Close vents on the low pressure side of the pressure-reducing valve	R	R			X	X
Reconnect all piping	R	R			X	X

# BUILDING HEATING SYSTEM

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

RADIATOR	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect:						
Radiator for leaks	D P R	D P R	X  X	X X  X	X X X X	X X X X
Radiator controls for proper operation	D P R	D P R	X  X	X X  X	X X X X	X X X X
M & R activities:						
Repair or replace radiator where necessary	D P R	D P R	X  X	X X  X	X X X X	X X X X
Repair radiator controls where necessary	D P R	D P R	X  X	X X  X	X X X X	X X X X
Drain radiator	D	D			X	X
Dry radiator tubes using compressed air	D				X	X
Clean radiator fins	P R	 R	X  X	X X  X	X  X	X  X

# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

STEAM SUPPLY AND RETURN PIPING IN BUILDINGS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect:						
Steam and return lines for leaks	D P R	D P R	X X X	X X X	X X X	X X X
Steam lines for missing or deteriorated insula- tion	D P R	D P R	X X X	X X X	X X X	X X X
Steam and return line pipe supports for damage or deterioration	D/P R	D P R	X X X	X X X	X X X	X X X
M & R activities:						
Repair steam and return line leaks	D P R	D P R	X X X	X X X	X X X	X X X
Replace missing or dete- riorated steam line in- sulation	D P R	D P R	X X X	X X X	X X X	X X X
Repair or replace damaged or deteriorated steam and return line pipe supports	D/P R	D P R	X X X	X X X	X X X	X X X
Flush steam and return lines with fresh water	D/R	D/R			X	X



# BUILDING HEATING SYSTEMS

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

STEAM SUPPLY AND RETURN PIPING IN BUILDINGS (continued)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Drain steam and return lines	D	D			X	X
Dry steam and return lines with compressed air	D				X	X
Cover all steam and re- turn line openings with caps, blank flanges, or wooden plugs	D	D			X	X
Coat all pipe threads and finished surfaces left exposed by disconnecting for draining with a film of graphite and oil	D	D			X	X
Remove all preservatives from flanges, nipples, and threaded openings	R	R			X	X
Remove all blanks in steam and return lines and reconnect piping	R	R			X	X

# **BUILDING HEATING SYSTEMS**

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

STEAM SUPPLY LINE TRAPS AND STRAINERS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect:						
Traps for proper operation	D P R	D P R	X X X	X X X	X X X	X X X
M & R activities:						
Repair or replace traps where necessary	D P R	D P R	X X X	X X X	X X X	X X X
Disassemble and clean strainers	D P R	D P R	X X X	X X X	X X X	X X X
Flush traps and strainers with fresh water and drain	D	D			X	X

## **APPENDIX H:**

### **INSPECTION AND M&R CHECKLISTS FOR AIR-HANDLER UNITS (AHUs)**

#### **General Notes**

Permanent filters should be removed and cleaned. Throw-away filters should be discarded if dirty, and the filter bank should be tagged with the size and type of filter required for reactivation of the system. Belts should be detensioned, removed and hung by the motor/drive system. Tags should be attached to pulleys with belt size and type specifications for easy determination of proper replacement during reactivation.

Fans and motors should be manually rotated during periodic inspection to ensure smooth rotation. If the equipment does not run smoothly, repairs and preservation should be performed. A note should be made of the deficiency, at a minimum. Fans, dampers, coils, and associated equipment should be cleaned prior to deactivation to minimize mold, mildew, and other microbial growth during the inactive period. These precautions should help minimize potential indoor air quality problems when the building is reactivated.

Every attempt should be made to prevent moisture damage to motors, bearings, and associated components of the AHU. If the risk of flood is significant, the motor should be removed and stored in an appropriate container to prevent moisture damage. Periodic inspections should include checking all components for water and pest-related damage.

#### **Subcomponent List for Air-Handler Units**

*Centrifugal Fan*  
*Axial Fan*  
*Fan Housing*  
*Weatherproof Fan Housing*  
*Fan Motor*  
*Fan Belt*  
*Fan Shaft Bearings*  
*Replaceable Filter Elements*  
*Ducting*  
*Dampers*  
*Damper Actuator Motors*  
*Fire Dampers*  
*Coils*  
*Controls*  
*Temperature Sensors*  
*Bird Screens*

# GENERAL BUILDING TYPES

## AIR HANDLER UNITS - SPACE CONDITIONING

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

CENTRAL AIR HAND- LERS & VENTILATION EQUIPMENT	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
INSPECT FOR:						
Outside air intake birdscreen damage and holes allowing animal intrusion	D/R P	D/R P	X	X X	X	X X
Fans, motors, ducts for moisture, cor- rosion, or mold and mildew	D/R P	D/R	X	X X	X	X X
Fans, motors for proper operation and smooth rotation	D/R P	D/R	X	X X	X	X X
Electrical contacts controls and equipment for corrosion	D/R P	D/R	X	X X	X	X X
Fire stat and fire dampers for proper operation	D/R P	D/R	X	X X	X	X X
Drive belts for tension and wear requiring replace- ment	D/R	R	X	X	X	X
Filters for clean- liness	D/R	R	X	X	X	X
M & R ACTIVITIES						
Repair OA intake birdscreen as required	D/P/R	D/R	X	X	X	X

# GENERAL BUILDING TYPES

## AIR HANDLER UNITS - SPACE CONDITIONING

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

CENTRAL AIR HAND- LERS & VENTILATION EQUIPMENT (CONT.)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
M & R ACTIVITIES						
Seal outside air intake by insuring that dampers are fully closed. Label control panel	D			X		X
Preserve motor to prevent corrosion & remove or pack to insure dry storage	D			X		X
Detension belts and lube bearings. Put preservative on un- painted machined areas	D	D	X	X	X	X
Clean fan blades, housing, bearings, dampers. Replace or refresh filter media	D/R	R	X	X	X	X
Lubricate dampers, actuators as required	D/R			X		X
Install motor, lubricate motor, fan bearings	R			X		X
Retension all belts	R	R	X	X	X	X

# GENERAL BUILDING TYPES

## AIR HANDLER UNITS - SPACE CONDITIONING

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

CENTRAL AIR HAND- LERS & VENTILATION EQUIPMENT (CONT.)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
M & R ACTIVITIES						
Log any equipment degradation and re-treat as required during inspection. Remove any nests or other materials resulting from animal or human intrusion & reseal equipment. Remove moisture from electrical components.	P		X	X	X	X
Repair or replace fire stat if required	R	R	X	X	X	X
Open outside air intakes and clear debris	R		X	X	X	X
Perform low voltage ohm-meter test on motor for adequate electrical insulation	R		X	X	X	X
Dry motors with low insulation resistance. Assemble, lubricate and re-install or replace	R	R	X	X	X	X
Run fan & check for proper & smooth operation	R	R	X	X	X	X

# GENERAL BUILDING TYPES

## AIR HANDLER UNITS - VENTILATION

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

MECHANICAL ROOM EXHAUST FAN	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
INSPECT FOR:						
Birdscreen holes or other damage	D/R P	D/R	X	X X	X	X X
Fan and motor pro- per operation by manual rotation	D P R	R	X X	X X X	X X	X X X
M & R ACTIVITIES						
Repair/replace birdscreen	D/R P	D/R P	X	X X	X	X X
Lubricate motor and fan bearings	D/R P	D/R	X	X X	X	X X
Clean fan blades, housing, and fire dampers	D/R	R	X	X	X	X
Clean, lubricate bearings, check wiring for damage	R		X	X	X	X
Replace or repair motor, bearings as required	R	R	X	X	X	X
Run fan and insure proper operation	R		X	X	X	X

# GENERAL BUILDING TYPES

## AIR HANDLER UNITS - VENTILATION

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

POWER ROOF VENTILATORS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
INSPECT FOR:						
Birdscreen holes or other damage (annual periodic)	D/R P	D/R	X	X X	X	X X
Fan and motor for proper operation by manual rotation	D/R P	R	X	X X	X	X X
Fire stat, damper for proper opera- tion	D/R	D/R	X	X	X	X
M & R ACTIVITIES						
Repair and replace birdscreen	D/R P	D/R	X	X X	X	X X
Detension belt and lube motor and bearings	D	D		X		X
Clean fan blades and housing	D		X	X	X	X
Lubricate fire dampers as required	D/R	D/R	X	X	X	X
Repair/replace fire dampers and fire stat as required	R	R	X	X	X	X
Rotate fan shaft and lube bearings as required	P	P		X		X



# GENERAL BUILDING TYPES

## AIR HANDLER UNITS - VENTILATION

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

POWER ROOF VENTILATORS (CONTINUED)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
M & R ACTIVITIES						
Replace/repair motor, belt, bear- ings as required	R	R	X	X	X	X
Install and adjust new belt and lubri- cate bearings	R	R		X		X
Clean fan blades and gravity dampers	R		X	X	X	X
Run fan and check for proper opera- tion	R		X	X	X	X

THEATER, PX, GYMNASIUMS

AIR HANDLER UNITS - HUMIDITY CONTROL

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

AIR HANDLERS & VENTILATION EQUIPMENT	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
INSPECT FOR:						
Outside air intake birdscreen for damage and holes allowing animal intrusion	D/P/R	R	X	X	X	X
Fans, motors, ducts for moisture, cor- rosion, or mold and mildew	D/P/R	D/R	X	X	X	X
Fans, motors for proper operation and smooth rotation	D/P/R	R	X	X	X	X
Electrical con- tacts, controls, and equipment for corrosion	D/P/R	R	X	X	X	X
Fire stat and fire dampers for proper operation	D/P/R	D/R	X	X	X	X
Drive belts for tension and wear requiring replace- ment	D/P/R	R	X	X	X	X
Filters for clean- liness	D/P/R	R	X	X	X	X
M & R ACTIVITIES						
Repair OA intake birdscreen as re- quired	D/P/R	R	X	X	X	X

# THEATER, PX, GYMNASIUMS

## AIR HANDLER UNITS - HUMIDITY CONTROL

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

AIR HANDLERS & VENTILATION EQUIP. (CONT.)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
M & R ACTIVITIES						
Clean fan blades, housing, bearings, dampers. Replace or refresh filter media	D/R	R	X	X	X	X
Lubricate dampers, actuator as required	D/P/R			X		X
Log any equipment degradation and re- treat as required during annual in- spection. Remove any nests or other materials resulting from animal or human intrusion and reseal equipment. Remove moisture in- trusion	P		X	X	X	X
Retension all belts	D/P/R	D/P/R	X	X	X	X
Repair or replace fire stat if re- quired	D/P/R	R	X	X	X	X
Clean OA intake of debris	D/P/R	R	X	X	X	X
Run fan and check for proper and smooth operation	D/P/R	D/R	X	X	X	X

THEATER, PX, GYMNASIUMS

AIR HANDLER UNITS - HUMIDITY CONTROL

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

AIR HANDLERS & VENTILATION EQUIP. (CONT.)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
M & R ACTIVITIES						
Perform low voltage ohm-meter test on motors for adequate electrical insula- tion	R		X	X	X	X
Dry motors with low insulation resist- ance and reinstall or replace	R		X	X	X	X

# ROLLING PIN BARRACKS

## AIR HANDLER UNITS - VENTILATION

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

LAUNDRY EXHAUST FANS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
INSPECT FOR:						
Birdscreen holes or other damage	D/R P	D/R	X	X X	X	X X
Fan and motor proper operation by manual rotation	D/R	R	X	X	X	X
Damper	D			X		X
M & R ACTIVITIES						
Repair/replace birdscreen	D/R P	D/R	X	X X	X	X X
Remove motor, pre- serve w/appropriate lubricant and put in dry storage	D			X		X
Clean fan blades and housing	D/R		X	X	X	X
Fix damper closed & label accordingly	D			X		X
Lubricate dampers	D/R	R	X	X	X	X
Install motor, align, adjust and lubricate	R			X		X
Replace or repair motor and bearings as required	R	R	X	X	X	X
Run fan and ensure proper operation	R	R	X	X	X	X

# GENERAL BUILDING TYPES

## AIR HANDLER UNITS - FIRE SAFETY EQUIPMENT

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

FIRE DAMPERS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
INSPECT FOR:						
Proper operation of dampers, link- ages and controls (annually)	D/R P	D/R P	X	X X	X	X X
M & R ACTIVITIES						
Repair/repaint/lub- ricate components as required to in- sure safe operation	D/P R	R	X	X X	X	X X

## **APPENDIX I:**

### **INSPECTION AND M&R CHECKLISTS FOR REFRIGERATION SYSTEMS**

#### **General Notes**

Deactivation procedures are similar to the standard winterization that the installation performs annually to ensure that the refrigeration system sustains no major damage including corrosion, refrigerant loss, motor degradation, or moisture ingestion. Additional care must be taken to clean, paint, or otherwise protect all exposed surfaces susceptible to corrosion. All water-side plumbing should be drained to prevent freeze or corrosion damage. Dielectric couplings should be intact between all dissimilar metal components in the plumbing loops. Pumps and motors should be lubricated and protected from the elements.

Refrigerant should be pumped down into the receiver. Recover any excess refrigerant. Refrigerants should not be purged to the atmosphere. Check receiver connections and valves for leaks, and replace or repair any leaking ones to avoid refrigerant loss. The compressor crankcase should be filled with the normal operating oil to cover the seal and main bearings. The compressors need to be appropriately tagged to prevent operation until the excess oil is removed. The compressor valve plate and housing should be flooded with oil.

Disconnect the electrical service from chillers and appropriately tag. Switchgear should be sealed and preserved using procedures similar to those outlined in the section on the interior electrical building component (Volume I, Chapter 4).

Perform annual inspection to identify and correct any significant deterioration resulting from animals, moisture, vandalism, or preservation failure. Equipment should be retreated as needed. Log any other degradation for later action.

During reactivation, make sure that all protective coatings and coil, fan, and opening covers are removed. The electrical connections, valves, pumps, fans, and coils should be checked for corrosion and proper operation. Excess oil must be properly drained from the compressor crankcase. Leak tests should be repeated to ensure that the compressor is maintaining its charge. Stringent requirements for avoiding chlorofluorocarbon (CFC) leaks during chiller servicing and operation will most likely be required by State or Federal law at the time of reactivation.

## **Subcomponent List for Refrigeration Equipment**

*Reciprocating Compressor/Motor*

*Evaporator*

*Condenser Coils*

*Cooling Tower*

*Expansion Valve*

*Refrigerant Loop Plumbing*

*Plumbing Insulation*

*Axial Condenser Fan/Motor*

*Motor Control Center*

*Controls*

*Temperature Sensor*

*Condenser Water Plumbing Loop, Pump, Controls*

*Isolation Valves*

*Cylinder Valves and Unloaders*



# GENERAL BUILDING TYPES

## REFRIGERATION SYSTEMS - BUILDING AIR CONDITIONING

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

MECHANICAL REFRIG- ERATION EQUIPMENT	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
INSPECT FOR:						
Coils, surfaces for corrosion	D/P/R	D/P/R	X	X	X	X
Lubricant condition and level for motors and other rotating components	D/R	D/R	X	X	X	X
Seals, plumbing, drains for leaks and damage	D/P/R	D/P/R	X	X	X	X
Electrical con- tacts, controls and materials for corrosion	D/P/R	D/P/R	X	X	X	X
M & R ACTIVITIES						
Pump down refriger- ation system, store refrigerant in re- ceiver. Excess re- frigerant shall be properly placed in storage cylinders	D	D	X	X	X	X
Test receiver con- nections and valves for leaks	D/R	D/R	X	X	X	X
Wire brush and clean cooler and condensor coils w/ compressed air	D		X	X	X	X

# GENERAL BUILDING TYPES

## REFRIGERATION SYSTEMS - BUILDING AIR CONDITIONING

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

MECHANICAL REFRIG- ERATION EQUIPMENT (CONTINUED)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
<b>M &amp; R ACTIVITIES</b>						
Fill crankcase w/ oil to cover seals and main bearings- use oil used in normal operation of machine. Red tag compressor w/:"Do not operate until excess oil has been removed." Flood valve plate and seal housing w/same oil	D	D	X	X X	X	X X
Block off or cover all air discharge and intake open- ings, dampers to coils	D	D	X	X X	X	X X
Disconnect equip- ment from power and tag "discon- nected from elec- trical service"	D	D	X	X X	X	X X
Remove fuses, wrap in waterproof paper and attach to equipment. Label fuse and machine appropriately	D D		X X	X	X X	X
Remove blocking and other protective coatings on in- active equipment	R	R	X	X	X	X

# GENERAL BUILDING TYPES

## REFRIGERATION SYSTEMS - BUILDING AIR CONDITIONING

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

MECHANICAL REFRIG- ERATION EQUIPMENT (CONTINUED)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
M & R ACTIVITIES						
Drain all water filled condensers, cooling towers. Leave drain open, put preservative lubricant on plug and threads to pre- vent corrosion. Blow coils out with compressed air. Attach plug to coil with wire	D	D	X	X	X	X
Log any equipment degradation and re- treat as required during annual in- spection. Remove any nests or other materials resulting from animal or human intrusion and reseal equipment. Remove moisture in- trusion from elec- trical components	P			X		X
Drain preservative oil from bearings and refill w/appro- priate grade oil	R	R	X	X X	X	X X
Replace fuses and reconnect to power source	R		X	X	X	X

# GENERAL BUILDING TYPES

## REFRIGERATION SYSTEMS - BUILDING AIR CONDITIONING

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = Year  
d = Days

MECHANICAL REFRIG- ERATION EQUIPMENT (CONTINUED)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
M & R ACTIVITIES						
Open compressor discharge, suction, and refrigerant line valves (except liquid line valve)	R	R	X	X	X	X
Reconnect control wires and fuses. Connect to electric service, verify operation	R	R	X	X X	X	X X
Check system for refrigerant leaks; eliminate leaks	R	R	X	X	X	X
Retension all belts	R	R	X	X	X	X
Replace plugs in water coil and/or cooling tower	R	R	X	X	X	X
Reconnect water supplies	R	R	X	X	X	X
Check control ad- justments and con- tinue leak testing Recharge w/refrig- erant as required	R	R	X	X	X	X

## **APPENDIX J:**

### **INSPECTION AND M&R CHECKLISTS FOR MESS HALL EQUIPMENT**

#### **General Notes**

The procedures given here are for equipment that is unique to mess halls. Procedures for equipment and fixtures that are present in general building types are not given here. References to the general component checklists, such as plumbing, are given in the mess hall checklist as needed.

The plumbing procedures are similar to those used for general building types with some additional types of fixtures. The additional plumbing fixtures to be included are dishwashers, vegetable peelers, can washers, pot sinks, cook sinks, scullery sinks, and coffee stations. As in the procedure for general buildings, the mess hall plumbing system will be completely drained and dried with compressed air. The Minimal procedures eliminate inspections. It should be noted that this may result in the seepage of sewer gas into the building.

The gas distribution procedures are the same as those given in the gas distribution section. The gas valve to the building will be closed and locked, and pressure will be relieved on gas-fired appliances such as stoves, ovens, deep fryers, and grills.

All electric motors used in convection ovens and other mess equipment should be preserved to avoid moisture damage to the windings or corrosion to bearings and other moving parts. Refrigeration equipment should be carefully drained, cleaned, and disconnected from the electrical service. Coils, shelves, and door seals should be cleaned of all dirt and grease. All components that could suffer corrosion during the inactive period should be coated with a nontoxic preservative acceptable for food-handling equipment.

All efforts should be made to ensure that refrigeration equipment is properly preserved to prevent any refrigerant leakage. Personnel performing periodic equipment inspection and reactivation should be aware of any new requirements for avoiding refrigerant leakage to the atmosphere that have been required after this document was developed.

### **List of Mess Hall Subcomponents**

This checklist includes only those items specific to mess halls. Other components (e.g., plumbing system) are addressed in the checklists for general building types.

*Can Washer*  
*Coffee Station*  
*Cook Sink*  
*Dishwasher*  
*Pot Sink*  
*Scullery Sink*  
*Steam Table*  
*Vegetable Peeler*  
*Gas Stoves*  
*Gas-fired Ovens*  
*Gas-fired deep Fryers*  
*Gas Grills*  
*Other Gas-Fired Kitchen Equipment*  
*Ice Makers*  
*Upright Freezers*  
*Walk-in Freezer*  
*Walk-in Refrigerator*  
*Upright Refrigerators*  
*Electric Food Warmers*  
*Convection Ovens*

# MESS HALL EQUIPMENT

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
PLUMBING						
Inspect for:						
Items listed in the general building type plumbing checklist	P		X	X	X	X
M&R activities as required:						
Follow procedures in the general building type plumbing checklist. Insert the following procedures after "Drain lines to and from each drinking fountain and associated tank"	D	D	X	X	X	X
Drain lines to and from each can washer	D	D	X	X	X	X
Drain lines to and from each vegetable peeler	D	D	X	X	X	X
Drain lines to and from each pot sink	D	D	X	X	X	X
Drain lines to and from each cook sink	D	D	X	X	X	X
Drain lines to and from each coffee station	D	D	X	X	X	X
Drain lines to and from each dishwasher	D	D	X	X	X	X

=====	=====	=====	=====	=====	=====	=====
PLUMBING (CONT'D)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
=====	=====	=====	=====	=====	=====	=====
Drain lines to and from each scullery sink	D	D	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Follow procedures in the general building type plumbing checklist. Insert the following procedures after "Replace pressure regulator, washers, and packing for each drinking fountain. Replace unit if necessary."	R	R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace washers and packing for each can washer	R	R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace washers and packing for each scullery sink	R	R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace washers and packing for each pot sink	R	R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace washers and packing for each cook sink	R	R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace washers and packing for each vegetable peeler	R	R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace washers and packing for each dish- washer	R	R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Replace washers and packing for each coffee station	R	R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====



GAS-FIRED EQUIPMENT	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Follow the procedures given in the Gas Distribution System checklist. This involves shutting off the gas and relieving pressure from all gas-fired appliances.	D/P/R	D/P/R	X	X	X	X
MISCELLANEOUS						
Drain steam tables and blow out with compressed air to remove moisture	D	D	X	X	X	X
REFRIGERATION - WALK-IN, SELF CONTAINED, ICEMAKERS						
Inspect for:						
Coils, surfaces for corrosion	D/P/R	D/P/R	X	X	X	X
Lubricant condition and level for motors and other rotating components	D/R	D/R	X	X	X	X
Door seals, plumbing, drain for leaks/damage	D/P/R	D/P/R	X	X	X	X

=====	=====	=====	=====	=====	=====	=====
REFRIGERATION (CONT'D)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
=====	=====	=====	=====	=====	=====	=====
M&R activities as required:						
Clean all interior surfaces shelves and coils	D	D	X	X	X	X
Clean, dry and coat all meat hooks, defrost dishes with corrosion preventive non-toxic preservative for food handling equipment	D	D	X	X	X	X
Wrap coated components with greaseproof paper	D	D	X	X	X	X
Clean door gaskets with soap and water, dry	D	D	X	X	X	X
Place paper between door gasket and cabinet, close	D	D	X	X	X	X
Disconnect equipment from power & tag "disconnected"	D	D	X	X	X	X
Remove fuses, wrap in waterproof paper and attach to equipment, label	D		X	X	X	X
Clean evaporator and con- densor coils and dry with compressed air	D		X	X	X	X
Reapply preservative as required to prevent corrosion	P	P		X		X
Check door gaskets, hinges, latches, renew as required	R	R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

REFRIGERATION (CONT'D)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Remove paper and protective coatings for equipment	R	R	X	X	X	X
Replace fuses and reconnect to power source	R		X	X	X	X
Repair insulation, joints and interior finish as reqd	R	R	X	X	X	X
Check system for refrigerant leaks; eliminate leaks	R	R	X	X	X	X
Retension all belts	R	R	X	X	X	X
Reconnect water supplies	R	R	X	X	X	X
Check control adjustments and continue leak testing Recharge with refrigerant as required	R	R	X	X	X	X
AIR HANDLING UNITS AND MECHANICAL REFRIGERATION FOR AIR CONDITIONING						
Inspect for:						
Items listed in the general building air handler and mechanical refrigeration checklists	D/P/R	D/P/R	X	X	X	X
M&R activities as required:						
Follow procedures in the general building type air handler unit and mechanical refrigeration checklists	D/P/R	D/P/R	X	X	X	X

## **APPENDIX K:**

### **INSPECTION AND M&R CHECKLISTS FOR STEAM HEATING SYSTEM**

#### **General Notes on Boiler Plant Deactivation**

##### *Boilers*

Fire the boiler under normal startup procedure and establish a 50 pounds per square inch gauge (psig) drum pressure. Secure the boiler and when the pressure decays to 20 psig, drain immediately under air. As soon as possible, open the drums to allow air to circulate for drying of all internal surfaces. Clean the boiler internally by turbinizing or scraping tubes, and scraping and wire brushing drums, shells, and water legs. Deposits of salt, scale, and corrosion are to be removed as much as possible. Exposed exterior surfaces of drums, shells, water legs, and water walls are to be cleaned and painted. Install trays containing a moisture absorbent (silica gel is preferred) into the drums at the rate of 1 lb per 1000 lb/hr steam flow capacity. To ensure against overflow of corrosive liquid due to desiccant swelling, the trays should not be more than three-quarters full of dry absorbent. Attach a source of nitrogen to the steam drum vent, close all other vents and drains, and pressurize the boiler to 10 to 15 psig with nitrogen. With the boiler pressurized, alternately open all boiler drains to purge air from the unit until pressure decays to zero. Repeat this process until only a minimal amount of oxygen is left in the boiler. The unit should now be stored under 5 to 10 psig nitrogen pressure maintained at the steam drum. Warning signs should be attached indicating that the boiler is stored under nitrogen pressure and that complete exhaustion of the nitrogen must occur before anyone enters the drum. Otherwise, death by suffocation may occur.

##### *Fans*

Fan wheels and shafts will be removed and repainted when required. Casings and housings will be dismantled to the extent necessary to clean and repaint them properly. Bearing surfaces and journals will be protected with adhesive tape PPP-T-60b, Type 1, Grade A, to prevent paint from entering bearing surfaces.

##### *Firing Equipment*

The firing end of oil burners will be covered with heavy dustproof and waterproof paper tightly fastened in place. All oil will be drained from the pump, valves, lines, and reservoirs. Where the burners can be swung out from the firing port, they will be wrapped with dustproof and weatherproof paper. Openings on oil tanks will be closed. All oil will be removed from the system.

Gas burners will be cleaned to remove gums and sulfates. Louvers will be closed and fastened into position. Primary air openings will be closed.

##### *Controls and Instruments*

Controls and instruments that are to remain in place, such as gages, thermometers, thermostats, and accessories, will be wrapped individually with waterproof paper meeting the requirements of Federal Specification (Fed. Spec.) UU-P-271d. Wrapping will be sealed with Adhesive Tape PPP-T-60b, Type 1, Grade A. Bonnet and stack-mounted controls will be removed, thermostatic elements cleaned and oiled with Military Standard MIL-L-21260, Grade 2 oil, and replaced in their mounting flange and wrapped as described above. All containers for water, ink, or acid on meters or instruments will be drained

completely and cleaned. Items that are removed will be wrapped as specified above, packed in suitable cartons, properly labeled, and securely attached to the equipment of which they are a part.

#### *Pumps*

Pumps will be flushed with fresh water and drained. Interior surfaces, including such parts as impellers, rotors, pistons, air chambers, vanes, valves, cylinder walls, and oil-air steam or water passages, will be coated with engine preservative oil MIL-L-21260, Grade 2. Preservative will be applied by spraying or fogging while slowly actuating the pump. Shafts will be covered by compound preservative MIL-C-11796B, Class 2. All openings will be sealed with pressure-sensitive tape MIL-T-4053B. Petcocks will be left open. Where there is a possibility that pump pits may be flooded, the pump will be raised above floor level.

#### *Feedwater Equipment*

Feedwater heaters, deaerators, and vent condensers will be drained completely. The equipment will be opened, and all deposits of silt and scale removed. Equipment will be left open. Vent pipes will be capped and the exhaust head covered. Overflow and oil traps will be cleaned and reassembled.

#### *Water Softeners (Zeolite)*

For steel pressure type softeners, the softener will be generated in the usual manner, then drained by the lowest drain connection or drain plug. The top manhole, handhole, or plug will be removed. Water lines will be drained and openings capped or blocked off. Softener tanks, valves, and piping will be cleaned and painted. The inside of the tank will be scraped and cleaned above the zeolite bed and painted with a bitumastic-base paint. Manhole covers will be left open, or plugs taken out, and fastened securely to the tank or piping. The brine or salt tanks will be emptied, scraped, washed clean, and painted with a bitumastic base paint both inside and out. Salt will be stored. For wood gravity-type softeners, the softener will be regenerated and filled with water to prevent drying. Pipelines will be disconnected, cleaned, and painted. Multiport valves of either manual or automatic type will be greased internally. Hydraulic valve lines will be drained and cleaned.

#### *Tanks and Receivers*

Tanks and receivers will be drained, opened, wire brushed, and washed clean of all deposits of mud, scale, and blisters. Manholes and handholes will be left open with plates securely attached to the tank or receiver. Interior surfaces of tanks that cannot be painted will be sprayed or fogged with preservative conforming to specification MIL-C-16173C, Grade 3. Compressed air receivers will be drained and preserved with engine preservative oil conforming to specification MIL-2-21260, Grade 2.

#### *Piping in Boiler Plant*

All piping will be completely drained, dried, and cleaned. All pipe threads and finished surfaces left exposed by disconnecting for draining will be protected by a film of graphite and oil. All openings will be covered tightly with caps, blank flanges, or wooden plugs, firmly fastened in place.

#### *Periodic Inspection and M&R During Boiler Plant Layup*

If proper procedures have been followed in deactivating the boiler plant, only minimal periodic inspection and maintenance will be required. It is recommended that the inspection and maintenance procedures given here be performed on a semiannual basis. Boilers should be opened and the desiccant

checked and replaced as necessary. Since air will enter the boiler during this operation, it will be necessary to purge this air with nitrogen and reestablish the 5 to 10 psig nitrogen pressure using the procedures discussed earlier for deactivation. Shafts of large rotating equipment should be lubricated and rotated to prevent the occurrence of a permanent set. External surfaces of boilers, tanks, unfired pressure vessels, etc., should be inspected for evidence of external sweating and corrosion, and corrective action taken where necessary. In this connection, it may be necessary to use portable heating equipment at convenient points to keep surfaces above the dew point temperature.

## **Boiler Plant Reactivation**

### **Boilers**

Open the boiler and remove the moisture absorbent trays. Clean the boiler internally by turbinizing or scraping all tubes and scraping or wire brushing drums, shells, and water legs. Clean, replace and reconnect all drum internals. Clean and reassemble feedwater regulators, water columns, and gages. Reinstall hand hole caps and manhole covers with new gaskets. Clean and inspect combustion chambers and repair brickwork and baffles where necessary. Clean, inspect, and repair where necessary, stacks, breeching, and dampers. Remove all caps and blocks in breeching and stacks. Clean, reassemble, and adjust all control equipment. Check all soot blowers for alignment, ease of operation, and wear of nozzles. Clean, repair and reseat where necessary all blowdown valves. Disassemble, clean, repair, and reassemble all nonreturn and main header valves. Have the boiler inspected internally and externally with hydrostatic test and relief tested and adjusted by appropriate and authorized agency (see Army Regulation (AR) 420-49 and Technical Manual (TM) 5-650).

### **Fans**

Clean and lubricate all fan bearings, gears, etc. Check all damper and damper-operating mechanisms on fans. Check chain drives, gear drives, and belt drives for proper operation; adjust, install, or replace as required. Check motors that have been left in place in dry locations for proper insulation resistance by making tests on a 10 percent sampling of the group with a low voltage ohmmeter. Dry in a suitable oven any motors having low insulation resistance. Check motors equipped with sealed bearings that have not been operated for a year or more for ease of rotation. If satisfactory in this respect, give them an observed operation test of 4 hours or more with load, if practicable, to determine fitness for normal duty. Dismantle motors in which there is any indication of unsatisfactory bearing lubrication and install new bearings or contact the manufacturer for instructions.

### **Firing Equipment**

Check and clean all oil burner nozzles and orifices. Check oil lines and valves, and clean all strainers. Fill the systems and check the pumps for proper operation. Where separate oil pumping systems are installed and parts have been covered with preservative, clean the pump parts, repack, and reassemble. Check oil heaters and controls. Check oil pump motors as described in the section on fan reactivation. Check oil tanks for water and sediment.

Clean all gas burners and orifices. Remove all blanks and caps in gas line and air openings. Reconnect and assemble all disconnected gas pipes, meters, and controls. Inspect and adjust regulating valves, pilots, safety controls, and gasline valves. Blow out the gaslines to remove water or other accumulations.

### ***Controls and Instruments***

Remove all protective coverings and clean all instruments. Clean and reconnect all control lines. Refill with proper operating fluids. Recalibrate all instruments in accordance with manufacturer's recommendations. Check and restock with new reagents and boiler water testing equipment.

### ***Pumps***

Remove all internal and external protective coatings. Repack and lubricate bearings. Check by hand for ease of rotation. Check pump motors as described in the section on fan reactivation above. Check pumps for overheating after startup.

### ***Feedwater Equipment***

Open, clean, and replace all trays in proper alignment. Check all nozzles and distribution orifices. Check the overflow float and water level controls. Check the back pressure, vacuum breaker, and safety valves, and open the vent valve. Clean and check the oil separator and trap mechanism. Refill any loop seals. Remove all protective coatings from flanges, machined surfaces, and threads of all tapped openings. Clean, inspect, and replace as necessary gage glasses and thermometers.

### ***Water Softeners (Zeolite)***

For steel pressure type softeners, replace the zeolite mineral that has been lost to bring the bed to the required depth. Remove all caps and blanks in the water lines to the equipment. Replace the manhole covers and plugs using new gaskets where necessary. Clean, inspect, and reconnect all piping, valves, and drain connections. Clean, paint, and refill the brine tanks. Backwash the softener thoroughly. Reassemble all testing equipment. Regenerate the softener in accordance with manufacturer's standards.

For wood gravity-type softeners, replace the zeolite mineral that has been lost, to bring the bed to the required depth. Reconnect all lines that have been disconnected. Inspect the softener for leakage; repair and tighten the bands where necessary. Clean, paint, and refill the brine tanks. Backwash the softener thoroughly. Regenerate the softener in accordance with manufacturer's standards. On automatic type softeners, reenergize the electrical circuits.

Clean all multiport and automatic type valves. Check all meters for accuracy. Clean, replace the diaphragm, and reassemble all hydraulic valves. Clean and adjust all backwash brine and rinse controls.

### ***Tanks and Receivers***

Check tanks for corrosion. Clean out all deposits, mud, scale, etc., using a wire brush where necessary. Remove all blanks and caps and reconnect all piping. Reinstall manhole and handhole covers using new gaskets where necessary. Check the float controls on condensate receivers for condition and for proper operation. Check the cold water makeup valve and float mechanism on condensate receivers. Clean and check the blowdown tank for condition and for proper piping, venting, and draining.

### ***Piping in Boiler Plant***

Clean all protective coatings from flanges, nipples, and other parts, and inspect all piping. Reconnect all piping that has been disconnected. Remove all blanks and caps in the lines. Check all valves for proper operation, repacking and reseating as necessary. Check all traps for proper operation, and clean or replace the strainers. Check, clean and repair as necessary, all regulating valves. Replace the diaphragm and readjust the valves where necessary.

## **General Notes on Underground Heat Distribution System**

The procedures given here include (1) inspection procedures along with associated M&R activities and (2) shutdown and startup procedures for cold layup (see General Distribution System at the end of this checklist).

The Preferred procedure is designed to provide maximum operational and thermal efficiency during deactivation. The Minimal procedure is designed to eliminate safety hazards and to keep the manhole internals dry, but is not designed to preserve operational and thermal efficiency.

Currently, there are no sump pumps in the manholes at Fort Dix. The Preferred procedure recommends the installation of sump pumps to prevent standing water in the manholes. Standing water leads to accelerated deterioration of the insulation and piping material, particularly if the system is kept hot or warm. It should be noted that Fort Dix is a Class A site, which means that the water table or standing water is expected to be above the bottom of the system at any time. The water table is currently lower than usual because of dry weather conditions.

### ***Inspection***

The inspection procedure should be carried out at every manhole and building entry pit. It is recommended that the system be inspected every 3 months to achieve the best efficiency and to minimize system deterioration, so for the Preferred procedure, the system should be inspected every 3 months. For the Minimal procedure, the system should be inspected every 6 months.

In general, an inspection should not be necessary upon reactivation if the system has been inspected regularly as recommended above. If the recommended periodic inspections have not been performed, then the system should be inspected upon reactivation.

### ***Shutdown and Startup***

For cold layup of the system, only a general shutdown and startup procedure is given. Fort Dix personnel should use their standard shutdown and startup procedure. Workers should wear appropriate protective clothing to avoid burns and injuries. **NOTE THAT THE SYSTEM MUST BE STARTED UP SLOWLY, ON A SECTION-BY-SECTION BASIS.**

## **List of Steam Distribution System Components**

### ***Manholes***

***Grates/Solid Plates on Manhole Tops***

***Positive Gravity Drains***

***Manhole Access Ladders***

***Valves***

***Flange Gaskets***

***Steam Traps***

***Heat Carrier Piping, Insulation, and Casing***

***Condensate Return Piping, Insulation, and Casing***

***Vents***

***Sump Pumps (If Installed)***



### **Checklist Reference Notes**

In the checklist that follows, several items carry numbered notations. These notations designate the following:

(1) If water is found when conduit drain plugs are opened, this indicates a break in the heat-carrying pipe or conduit casing. A sample of the water should be taken and sent to a laboratory for analysis. If traces of water-treatment chemicals are found, this indicates a break in the heat carrier pipe. If traces are not found, a conduit pressure test should be performed to verify a leak in the conduit casing. The distance between manholes of defective sections should be noted for estimating purposes. The leak should then be repaired as appropriate.

(2) If conduit vents are steaming, laboratory and conduit pressure tests should be conducted to determine whether the leak is in the heat carrier pipe or in the conduit casing, as described in the previous paragraph. The leak should be repaired as appropriate.

(3) These procedures only apply if sump pumps have been installed in the manholes and building entry pits.

# UNDERGROUND HEAT DISTRIBUTION SYSTEM

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

ITEM	Pfr	Min	STEAM ON	STEAM OFF
Procedure				
GENERAL MANHOLE				
Inspect for:				
Water/ excessive moisture	D/P	D/P	X	X
M&R activities as required:				
Pump out manhole	D/P	D/P	X	X
GRATES AND SOLID PLATES ON MANHOLE TOPS				
Inspect for:				
Deterioration and corrosion which could present a safety hazard	D/P	D/P	X	X
M&R activities as required:				
Replace deteriorated open grate or solid plate covers	D/P	D/P	X	X
POSITIVE GRAVITY DRAINS				
Inspect for:				
Free flow operation	D/P	D/P	X	X
M&R activities as required:				
Free gravity drains	D/P	D/P	X	X

ITEM	Pfr	Min	STEAM ON	STEAM OFF
Procedure				
MANHOLE ACCESS LADDERS				
Inspect for:				
Corrosion/deterioration of ladder and rungs that could pose a safety hazard	D/P	D/P	X	X
M&R activities as required:				
Replace deteriorated ladder	D/P	D/P	X	X
VALVES				
Inspect for:				
Exercise to show free operation	D		X	
Check packing for leaks	D P R	D P R	X X	X X
Excessive corrosion	D R		X	X
Missing insulation	D R		X	X X
M&R activities as required:				
Replace leaky packing	D P R	D P R	X X	X X
Replace excessively corroded valves	D R		X	X
Replace missing insulation	D R		X	X

ITEM	Pfr	Min	STEAM	STEAM
Procedure			ON	OFF
FLANGE GASKETS				
Inspect for:				
Leaks	D P R	D P R	X X	X X
M&R activities as required:				
Replace leaky gaskets	D P R	D P R	X X	X X
STEAM TRAPS				
Inspect for:				
Proper operation	D P R	R R	X X	X
Excessive corrosion	D		X	
M&R activities as required:				
Replace inoperative or excessively corroded traps	D P R	R R	X X	X

ITEM	Pfr	Min	STEAM ON	STEAM OFF
Procedure				
PIPING				
Inspect for:				
Excessive corrosion	D		X	X
Deteriorated insulation on hot pipes	D		X	X
Deteriorated insulation covering on hot pipes	D		X	X
Condition of wall penetrations	D		X	X
Water stains at or near wall penetrations	D		X	X
Open conduit drain plugs and check for water flow	D/P		X	X
Excessive corrosion of supports	D		X	X
Excessive corrosion of conduit end plates	D		X	X
M&R activities as required:				
Replace deteriorated insulation and covering	D		X	X
Caulk deteriorated or leaking wall penetrations	D		X	X
Replace corroded supports	D		X	X
Replace corroded end plates	D		X	X
Determine source of water in conduit (1)	D/P	D/P	X	X
Repair leaks in heat carrying pipes	D/P	D/P	X	X
Repair leaks in casing	D/P	D/P	X	X

ITEM	Pfr	Min	STEAM	STEAM
Procedure			ON	OFF
VENTS				
Inspect for:				
Excessive corrosion	D R		X	X
Steaming	D/P		X	
M&R activities as required:				
Replace excessively corroded vents	D R		X	X
Determine source of steam and repair (2)	D/P		X	
SUMP PUMPS (3)				
Inspect for:				
Operation and continuity of electrical service to pumps, including: Fuses Circuit breakers Outlets in manhole Switches Hard wire connections	D/P (3)		X	X
Operation of pump, incl: Pump motor Pump switch Float mechanism Discharge piping	D/P (3)		X	X
Excessive debris in manhole which could clog pump or interfere with float operation	D/P (3)		X	X

ITEM	Pfr	Min	STEAM ON	STEAM OFF
Procedure				
SUMP PUMPS (3) continued				
M&R activities as required:				
Install sump pumps in man- holes and building entry pits	D		X	X
Repair inoperative electric service to pumps	D/P (3)		X	X
Repair sump pump	D/P (3)		X	X
Replace irreparable pump	D/P (3)		X	X
Remove debris from manhole	D/P (3)		X	X
GENERAL DISTRIBUTION SYSTEM				
Close steam valves	D			X
Drain steam lines and condensate lines at low points.	D			X
If unsure about system slope, blow out lines with compressed air to avoid water/moisture remaining at system low points.	D			X
Plug openings in steam and condensate system (drip lines and valves). Be sure system is sealed.	D			X
Open conduit drains.	D			X
If desired, blow compressed air through conduit casing to remove moisture.	D			X
Close drains	D			X

ITEM	Pfr	Min	STEAM	STEAM
Procedure			ON	OFF
GENERAL DISTRIBUTION SYSTEM				
Open all drain valves.	R			X
IMPORTANT! SYSTEM WILL BE ACTIVATED ONE SECTION AT A TIME!! THE FOLLOWING PROCEDURES ARE FOR EACH SECTION.				
Station a worker at each low point in the section.	R			X
Open bypass valves slowly. Workers at low points will see water, then steam/water mix, then pure steam at drain valves.	R			X
Slowly increase pressure.	R			X
Close drains when you have only steam (no water) at low points.	R			X
Increase pressure to 30 or 40 psi using bypass valves.	R			X
Verify operation of traps.	R			X
Open main valve very slowly	R			X
Bring section slowly up to pressure. This will take several hours.	R			X
Repeat procedure for each section of the system. Entire procedure will take several days.	R			X



## **APPENDIX L:**

### **INSPECTION AND M&R CHECKLISTS FOR GAS DISTRIBUTION SYSTEM**

#### **General Notes**

The gas mains at Fort Dix are owned by Public Service of New Jersey. The Army is responsible only for the laterals and service lines.

The lines are not cathodically protected.

Natural gas is used in only a small number of the buildings to be deactivated, most of which are dining halls.

Laterals will not be shut down; gas will be shut off only at buildings.

The inspection procedure should be performed annually. A good time to do the inspection is when the building is inspected for exterior painting.

There will not be a Do Nothing procedure for the gas lines. Leaving the valves open and letting gas remain in the lines would present a serious safety hazard.

#### **List of Gas Distribution System Subcomponents**

*Pipe and Fittings*

*Flange Gaskets*

*Escutcheons*

*Insulating Gaskets—Dielectric type*

*Valves for Isolation*

*Pipe Hangers and Supports*

*Pressure Regulators (Main and Service Lines)*

*Meters*

*Pressure-Relief Valves*

*Gas-Fired Kitchen Equipment*

# GAS DISTRIBUTION SYSTEM

NOTE: D = Deactivation  
P = Periodic  
R = Realignment

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

ITEM	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
Procedure			R<45d	R<45d	R>45d	R>45d
Inspect:						
Piping/ regulator outside each building for deterioration of the coating	D/P/R	D/R	X	X	X	X
		D/P/R	X	X	X	X
Piping/regulator for corrosion of pipes at soil/atmosphere interface	D/P/R	D/R	X	X	X	X
		D/P/R	X	X	X	X
Insure that regulator vent is operating properly.	D/P/R	D/R	X	X	X	X
		D/P/R	X	X	X	X
M & R activities:						
Replace existing cock on natural gas line to each deactivated building with a lock and key type cock.	D	D	X	X	X	X
Close and lock the cock. The piping and regulator should remain in place.	D	D	X	X	X	X
Relieve pressure on the gas-fired units in each building (mostly dining facilities)	D	D	X	X	X	X
Close the valves to the gas-fired units in the building.	D	D	X	X	X	X
Repaint or recoat affected areas of piping/regulator as needed.	D/P/R	D/R	X	X	X	X
		D/P/R	X	X	X	X

ITEM	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
Procedure			R<45d	R<45d	R>45d	R>45d
Repair inoperative vents	D/P/R	D/R	X	X	X	X
		D/P/R	X	X	X	X
Remove soil from around pipes at corroded areas and coat as needed	D/P/R	D/R	X	X	X	X
		D/P/R	X	X	X	X
Turn on gas to each building	R	R	X	X	X	X
Check all lines for leaks	R	R	X	X	X	X
If leaks exist, repair them	R	R	X	X	X	X
Light the pilot lights	R	R	X	X	X	X
Verify that main burners will light and that proper pressure/thermostatic control exists	R	R	X	X	X	X

**APPENDIX M:**

**INSPECTION AND M&R CHECKLISTS FOR PETROLEUM PRODUCTS STORAGE SYSTEM**

**PETROLEUM PRODUCTS STORAGE SYSTEM**

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation

UST CLOSURE PROCEDURE	Pfr & Min	TEMP	PERM IN PLACE	PERM STORE REINST	PERM REMOVE REPLAC
Inspection/M&R activities:					
Notify regulatory authorities	D	X	X	X	X
Contracting/scheduling for tank closure	D	X	X	X	X
Excavate to the top of the tank	D		X	X	X
Remove all product	D	X	X	X	X
Clean the tank	D R	X	X	X	X
Disconnect plumbing	D		X	X	X
Cap all fill lines	D	X			
Remove all fill lines	D		X	X	X
Cap gauging lines	D	X			

Remove gauging lines	D		X	X	X
Cap pump lines	D	X			
Cut off power	D	X			
Remove all other fixtures	D		X	X	X
Keep vent line open	P	X			
Plug all openings	D		X		
Check for release of product	D	X	X	X	X
Excavate around the tank	D			X	X
Purge the tank with CO2	D			X	X
Remove the tank	D			X	X
Dispose of the tank or scrap the metal	D				X
Implement periodic inspection program	P	X	X		
Fulfill reporting requirements	D	X	X	X	X

Fill the tank with inert materials	D		X		
Backfill the tank excavation area	D			X	X
Restore ground surface to original condition	D		X	X	X
Put locks on openings	D	X			
Check compatibility of fiberglass reinforced plastic (FRP) tank & new material to be stored	R	X			
Reconnect fill, gauging, pump lines & other plumbing	R	X			
Pressure test tank & piping for leaks & overall integrity	R	X			
Provide effective cathodic protection for steel tanks	R	X			
Check integrity of tank automatic shutoff & overfill alarms	R	X			
Certify compliance with New Jersey Admin. Code 7:14B-5.1 & 5.2 & any other applicable requirements	R	X			
Install &/or maintain tank gauging & vapor, ground-water & interstitial monitoring system	R	X			
Contract to install replacement tanks	R		X		X

Contract to install stored tanks	R			X	
Initiate an inventory program	R	X	X	X	X
=====	=====	=====	=====	=====	=====
If a leak exists:					
=====	=====	=====	=====	=====	=====
Report to regulatory authorities	D	X	X	X	X
Take health and safety precautions	D	X	X	X	X
Test tank tightness	D	X			
Assess risk and potential liabilities	D	X	X	X	X
Determine the extent of contamination	D	X	X	X	X
Perform preliminary investigation & hydrogeologic study	D	X	X	X	X
Recover product if possible & dispose of it	D	X	X	X	X
Remove contaminated soil & dispose of it	D	X	X	X	X
Clean groundwater, monitor soil & groundwater	D	X	X	X	X
Document the events to regulatory authorities	D	X	X	X	X
Repair or replace tank as needed	D	X			

## **APPENDIX N:**

### **INSPECTION AND M&R CHECKLISTS FOR SANITARY SYSTEM—POTABLE WATER SYSTEM**

#### **General Notes on Potable Water Distribution Lines**

Building shutoff valves should be located and repaired to eliminate leaks. Replacement, repacking, or breaking and capping lines should be considered. Building service line should be fitted with curbside valves and drained to safeguard against freezing; the other option is to break and cap the line. Also, repair and replace any damaged lines.

Water mains should be protected against partial clogging or leaking. Ream and reline mains. Locate leaks and repair as appropriate. Repair, repack, or replace faulty valves.

#### **General Notes on Water Wells and Tanks**

Wells on long-term standby should be inspected and tested periodically. Preventive maintenance should be conducted on wells, pumps, controls, and appurtenances.

Water treatment equipment at well head should be repaired and maintained in accordance with manufacturer manuals to prevent performance deterioration.

Elevated storage tanks should be safeguarded against deterioration of mechanical equipment. Inspect, clean, and lubricate mechanical parts periodically.

#### **General Notes on Water Treatment Plant**

Treatment processes such as softening and threshold treatment could be put on standby depending on the raw water mix. The treatment process standby equipment should be periodically serviced, including cleaning and lubrication.

Water treatment operation should be optimized to increase efficiency and accommodate demand fluctuations. An architectural/engineering (A/E) study for operator guidance may be necessary to satisfy the new operational objectives.

Pumps, valves, gauges, and controls should be kept in an acceptable operational condition because they may deteriorate as a result of low usage.



**Subcomponent List for Water Distribution Lines**

*Building Shutoff Valves*

*Building Service Lines*

*Water Mains*

**Subcomponent List for Water Wells and Tanks**

*Water Wells*

*Water Treatment Equipment at Well Head*

*Elevated Storage Tanks*

**Subcomponent List for Water Treatment Plant**

*Water Treatment Processes*

*Water Treatment Operation*

*Pumps and Controls*

# SANITARY SYSTEMS

## WATER - DISTRIBUTION LINES

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

DISTRIBUTION LINES	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Inspect and evaluate condition of water mains in the deactivated area.	D,R	D,R	X	X	X	X
Identify shutoff means (curbside/interior valves) for inactivated buildings.	D	D	X	X	X	X
Determine susceptibility of service lines to freeze.	D	D	X	X	X	X
Check semiannually (Spring & Fall) for frozen valves and leaks.	P	P	X	X	X	X
Perform complete inspection & record all high-severity defects for valves and building service lines.	R	R	X	X	X	X
Establish record of valve location.	D		X	X	X	X
Determine condition of valves and valve boxes.	D		X	X	X	X

DISTRIBUTION LINES	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
M&R activities as required:						
Coordinate deactivation of service lines with building closures.	D	D	X	X	X	X
Replace defective curbside valves.	D	D	X	X	X	X
Temporary repair all-high defects.	P	P	X	X	X	X
Repair or replace damaged shutoff valves.	P	P	X	X	X	X
Perform permanent repairs & coordinate reactivation of services with building reactivation.	R	R	X	X	X	X
Install curbside service valves, as necessary, to prevent freezing of service lines.	D		X	X	X	X
Perform annual complete inspection of water distribution system.	P		X	X	X	X
Permanently repair all high-severity defects.	P		X	X	X	X

# SANITARY SYSTEMS

## WATER - WELLS & TANKS

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

WELLS & TANKS	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Identify wells to be placed in standby status.	D	D	X	X	X	X
Routine semiannual inspection (Spring & Fall) for appurtenances & equipment.	P	P	X	X	X	X
Record high-severity defects prior to reactivation	R	R	X	X	X	X
Routine inspection for wells & treatment equipment every 30 days, for in-activated storage tanks (if any) every 90 days.	P		X	X	X	X
M&R activities as required:						
Clean, repair, & lubricate any component or mechanical equipment taken out of service.	D	D	X	X	X	X
Ensure that line pressure drops will not cause pressure-operated flush valves to open in active buildings.	D	D	X	X	X	X

=====	=====	=====	=====	=====	=====	=====
WELLS & TANKS	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	R<45d	R<45d	R>45d	R>45d
(Cont'd) M&R activities:						
Provide minimal maintenance for components in standby status.	P	P	X	X	X	X
Complete maintenance and permanent repairs for high-severity defects.	R	R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

# SANITARY SYSTEMS

## WATER - TREATMENT PLANT

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

W - TREATMENT PLANT	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Determine changes to processes as a result of reduced demand.	D	D	X	X	X	X
Determine condition of plant components in standby condition (every 90 days).	P	P	X	X	X	X
Perform complete inspection & record all high-severity defects.	R	R	X	X	X	X
Determine plant processes to be reactivated and/or supplemented to meet increased demand.	R	R	X	X	X	X
Determine changes to improve efficiency, coordinate with regulatory agencies.	P		X	X	X	X
Analyze treatment capability with increased demand, determine treatment process to be reinstituted.	R		X	X	X	X

=====	=====	=====	=====	=====	=====	=====
W - TREATMENT PLANT	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	R<45d	R<45d	R>45d	R>45d
M&R activities as required:						
=====	=====	=====	=====	=====	=====	=====
Perform normal preventive maintenance, cleaning, and lubrication for components taken out of service.	D	D	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Temporarily repair all high-severity defects in standby components.	P	P	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Complete maintenance and permanent repairs for all high-severity defects.	R	R	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Perform normal preventive maintenance for all plant components, including standby equipment.	P		X	X	X	X
=====	=====	=====	=====	=====	=====	=====

## **APPENDIX O:**

### **INSPECTION AND M&R CHECKLISTS FOR SANITARY SYSTEM—WASTEWATER SYSTEM**

#### **General Notes on Wastewater Collection System**

Sewer lines and manholes should be maintained and cleaned of any excessive sediment, grit, or sand. The structural integrity and functional performance should be inspected and recorded. Safeguard sewer lines against erosion and excessive infiltration/inflow, while manholes should be protected from vandalism during layaway period.

Lift-station pumps and controls should be maintained and/or replaced to provide acceptable performance. Influent lines should be flushed periodically to eliminate sediment, grit, or sand. Operational flexibility should be increased through the introduction of bypass lines on an as-needed basis.

#### **General Notes on Wastewater Treatment Plant**

Treatment processes such as trickling filters, clarifiers, and sludge digesters could be put on standby, depending on influent flows and concentrations. The treatment process standby equipment should be cleaned, flushed, drained, and periodically serviced including cleaning and lubrication.

Wastewater treatment operation should be optimized to improve effectiveness under low flow conditions and occasional fluctuations. Operational change should be considered to increase recirculation, improve flow equalization, and allow for longer settling periods.

Tanks, basins and auxiliary equipment should be serviced in accordance with Army Technical Manual (TM) 5-665 once removed from service.

#### **Subcomponent List for Wastewater Collection System**

*Sewer Lines and Manholes*  
*Lift Stations*

#### **Subcomponent List for Wastewater Treatment Plant**

*Treatment Processes*  
*Wastewater Treatment Operation*  
*Tanks, Basins, and Auxiliary Equipment*



# SANITARY SYSTEMS

## WASTEWATER - COLLECTION SYSTEM

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

=====	=====	=====	=====	=====	=====	=====
WW - COLLECTION SYSTEM	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	R<45d	R<45d	R>45d	R>45d
Inspect for:						
Inspect lift stations and evaluate performance under normal flow conditions.	R		X	X	X	X
M&R activities as required:						
Clean and repair sewer lines and lift stations in accordance with TM 5-665.	D	D	X	X	X	X
Perform temporary repair for all high-severity defects.	P	P	X	X	X	X
Complete maintenance and repair for all high-severity defects.	R	R	X	X	X	X
Perform routine maintenance on lift stations including pumps and controls.	R	R	X	X	X	X
Consider tack welding manhole covers to frames in unsecured deactivated areas to minimize vandalism.	D		X	X	X	X
=====	=====	=====	=====	=====	=====	=====

# SANITARY SYSTEMS

## WASTEWATER - TREATMENT PLANT

NOTE: D = Deactivation  
P = Periodic  
R = Reactivation

Pfr = Preferred  
Min = Minimal  
yr = year  
d = days

WW - TREATMENT PLANT	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Determine operational changes to improve plant efficiency under low flow conditions. Consider increased recirculation, flow equalization, and longer settling periods.	D	D	X	X	X	X
Determine condition of plant components in standby condition semiannually (Spring and Fall).	P	P	X	X	X	X
Perform complete inspection, record all high-severity defects.	R	R	X	X	X	X
Determine treatment process changes to meet increased effluent flows.	R	R	X	X	X	X
All facilities or components removed from service should be inspected and serviced in accordance with TM 5-665.	D		X	X	X	X
Determine operational status of all plant components.	P		X	X	X	X

WW - TREATMENT PLANT	P/Er	Min	D<1yr	D>1yr	D<1yr	D>1yr
			R<45d	R<45d	R>45d	R>45d
M&R activities as needed :						
Components taken out of service will be drained and cleaned, pumps and lines will be drained and flushed with clean water, mechanical equipment will be cleaned, oiled or greased and protected, sludge digestors will be drained (10-15% per week) then thoroughly ventilated and cleaned	D	D	X	X	X	X
Perform temporary repair for all high-severity defects in standby components.	P	P	X	X	X	X
Complete maintenance and permanent repair for all high-severity defects.	R	R	X	X	X	X
Perform normal preventative maintenance for all plant components in standby status every 90 days.	P		X	X	X	X

## **APPENDIX P:**

### **INSPECTION AND M&R CHECKLISTS FOR SANITARY SYSTEM--FIRE PROTECTION SYSTEM**

#### **General Notes on Fire Protection System**

Flow and pressure tests should be conducted periodically on water hydrants. Repair or replace broken hydrants. For unsatisfactory test results, flush or clean lines, make sure valves are open, and check for unusual discharge in vicinity.

Fire alarm systems should be checked periodically for proper operation. Repair and replace inoperable components.

#### **Subcomponent List for Fire Protection System**

*Water Hydrants*

*Fire Alarm System*

# SANITARY SYSTEMS

## WATER - FIRE PROTECTION

NOTE: D = Deactivation Pfr = Preferred  
P = Periodic Min = Minimal  
R = Reactivation yr = year  
d = days

W - FIRE PROTECTION	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
Inspect for:						
Inspect and evaluate condition of all fire protection facilities including alarm systems, hydrants and automatic sprinklers within the deactivated areas.	D	D	X	X	X	X
Perform flow and pressure tests for hydrants in deactivated areas.	D	D	X	X	X	X
Perform semiannual complete inspection for all fire protection facilities in deactivated areas.	P	P	X	X	X	X
Perform complete inspection and record all high-severity defects for alarm systems, hydrants, and automatic sprinklers.	R	R	X	X	X	X
Determine lines adequacy for fire demands through the use of field calibrated hydraulic models.	P		X	X	X	X

=====	=====	=====	=====	=====	=====	=====
W - FIRE PROTECTION	Pfr	Min	D<1yr	D>1yr	D<1yr	D>1yr
=====	=====	=====	R<45d	R<45d	R>45d	R>45d
M&R activities as needed :	=====	=====	=====	=====	=====	=====
Replace, repair, or maintain alarm systems, hydrants, and automatic sprinkler within the deactivated area.	D	D	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Conduct hydrants-flushing program on a regular basis.	P	P	X	X	X	X
-----	-----	-----	-----	-----	-----	-----
Reactivate any automatic sprinklers, as required.	R	R	X	X	X	X
=====	=====	=====	=====	=====	=====	=====

## APPENDIX Q:

### INSPECTION AND M&R CHECKLISTS FOR ELECTRICAL DISTRIBUTION SYSTEM

#### General Notes

During the deactivation period, the system will remain energized to ensure reliable power to all safety and security systems, including EMCS, sump pumps, fire and security alarming systems, security lighting, and forced-ventilation systems.

There is no difference in activities required for the reactivation scenarios of more than or less than 45 days. Additionally, there is no difference in deactivation for a short or long deactivation period.

Preventive maintenance (PM) will not be required for the deactivation period less than 1 year since the normal schedule of PM on most system components is annual. Anticipated PM includes repair of storm damage as well as normal deterioration of wood structures and other subcomponents to ensure safe and reliable operation of the distribution system. Maintaining reliable operation is essential since portions of the installation will remain active, including the adjoining Air Force base.

The Preferred scenario assumes that maintenance is performed before major component or system failure occurs (i.e., poles are inspected and repaired or replaced prior to collapse, and transformers and other components that require PM are serviced and tested on schedules defined by industry, Institute of Electrical and Electronics Engineers [IEEE], or other standards). The Minimal scenario assumes that equipment is repaired or replaced after failure.

Properly trained personnel are essential to ensure the safe and smooth operation of the electrical distribution system. They must be properly equipped and staffed to perform safe and adequate inspection and M&R of this system to ensure reliable power is delivered to fire, life-safety, flood control, and security systems in the deactivated areas of the installation.

Semiannual inspections and maintenance may not be adequate for certain equipment. Manufacturer's literature should be used to help determine the appropriate inspection and scheduled maintenance frequency. The National Fire Protection Association document NFPA 70B, *Recommended Practice for Electrical Equipment Maintenance*, and the Westinghouse text *Electrical Maintenance Hints* should be used for further guidance on frequency and type of maintenance activities for various electrical system components.

An appropriate recordkeeping system and routine tagging of equipment requiring repair should be initiated at the time of facility deactivation. This will help ensure that critical components and systems are identified and repaired in a timely fashion. All switchgear, transformation equipment, conductor connections, and circuit breakers or fuses must be periodically inspected for poor connections, corrosion, or other moisture damage. These conditions could lead to overheating of components, even in a lightly loaded circuit. Insulation should be inspected for degradation, and all grounding and lightning arrestor equipment should be tested for proper operation. NFPA 70B contains specific information on inspection procedures and frequency and recommended routine maintenance of distribution equipment that should be used to help determine the specific labor skills, manhours, and equipment required to adequately maintain the distribution system.

## **Subcomponents of Electrical Distribution System**

*Wood Poles*

*Wood Structures*

*Substation Transformers*

*Pole Mounted Transformers*

*Concrete-Pad-Mounted Transformers*

*Vault-Enclosed Transformers*

*"H" -Frame-Mounted Transformers*

*Constant Current Street Lighting Transformers*

*Utility Metering*

*Conductors*

- Copper
- Aluminum
- Anodized aluminum
- Steel-reinforced aluminum cable

*Overhead Conductors*

*Underground Conductors*

*Manholes for Underground Cable*

*rounding Equipment*

*Circuit Protection Equipment*

*Pole-mounted switches*

- Normally opened
- Normally closed
- Air break, manually operated

*Insulators*

*Bushings*

*Lightning Arrestors*



# DEACTIVATED BUILDINGS AND GROUNDS

## ELECTRICAL DISTRIBUTION

NOTE: D - Deactivation  
P - Periodic  
R - Reactivation

Pfr - Preferred  
Min - Minimal  
yr - Year  
d - Days

DISTRIBUION SYSTEM EQUIPMENT	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
INSPECT FOR:						
Rot, degradation, or failure of wood poles, structures, insulators, bushing which could cause power failure or safety hazard	D/P/R	R	X	X	X	X
Insulation degra- dation or failure of overhead and buried conductors	D/P/R	R P	X	X X	X	X X
Entire system for downed lines or poles and other failures after elctrical storms, ice storms, or heavy rains	P		X	X	X	X
Aboveground pole and conductor fail- ures.	D/P/R	P/R	X	X	X	X
Animal or human damage of conduct- ors, transformers, bushings, insul- ators, switchgear	D/P/R		X	X	X	X
Proper connection and operation of grounding and lightning suppres- sion equipment	D/P/R	D/P/R	X	X	X	X

# DEACTIVATED BUILDINGS AND GROUNDS

## ELECTRICAL DISTRIBUTION

NOTE: D - Deactivation  
P - Periodic  
R - Reactivation

Pfr - Preferred  
Min - Minimal  
yr - Year  
d - Days

DISTRIBUTION SYSTEM EQUIPMENT (CONTINUED)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
INSPECT FOR:						
Proper operation of automatic and manual disconnect and switching hardware.	D/R	D/R	X	X	X	X
Proper operation of all transformation equipment	D/P/R	D/P/R	X	X	X	X
Security and integ- rity of all equip- ment enclosures and vaults.	D/R P	D/R	X	X X	X	X X
M & R ACTIVITIES						
Repair damaged con- ductors, transform- ers, grounding equipment, wood poles and struc- tures and other hardware when in- spection indicates deficiency	D/P/R	R	X	X	X	X
Replace failed dis- tribution system components	D/P/R	D/P/R	X	X	X	X
Replace transformer oil and perform re- quired maintenance annually	D/R P	D/R	X	X X	X	X X

# DEACTIVATED BUILDINGS AND GROUNDS

## ELECTRICAL DISTRIBUTION

NOTE: D - Deactivation  
P - Periodic  
R - Reactivation

Pfr - Preferred  
Min - Minimal  
yr - Year  
d - Days

DISTRIBUTION SYSTEM EQUIPMENT (CONTINUED)	Pfr	Min	D<1yr R<45d	D>1yr R<45d	D<1yr R>45d	D>1yr R>45d
M & R ACTIVITIES						
Remove or repair damage to system components due to animal or human in- trusion (nests or tampering)	D/P/R	D/R	X	X	X	X
Perform scheduled replacement of con- ductors, insula- tors, bushings and other components subject to weather or time induced degradation	D/P/R	R	X	X	X	X
Perform load ana- lysis to determine adequacy and efficiency of existing design	R		X	X	X	X
Upgrade transform- ers, conductors and safety hardware to meet new system loads and current code requirements.	R	R	X	X	X	X